

7.2.1.2 Educational Facilities in Higher Education

The existing scenario of university, Art/Science/Commerce colleges and professional colleges for the Nagaon area is shown in the table given below:

Table 172 higher education facilities in Nagaon

Sl. No.	Category of Education Institutions	Total No. of Institutions	Enrolment	Teachers
3	High school	30	8420	452
4	Higher Secondary School	8	6028	359
5	1. General College	4		
	i. Nagaon College	1	3258	109 (79-part timer)
	ii. A.D.P College	1	1327	72
	iii. Khagarijan College	1	577	25
	iv. Nagaon Girls College	1	1189	51
	2. Junior College	28 (6 permitted)		-
	3. B. ED College	2	160	21
	4. Commerce College	1	-	-
	5. Law College	1	302	8
	6. Homeopathic College	1	-	-
	7. Polytechnic	1	452	110
	8. I.T.I	1	492	37
Total		168 Nos.	26155	2173

(Source: Inspector of Schools, Elementary and Higher education)



Figure 142 Nowgong Mission School

Table 173: Demand-Supply Gap Assessment of Educational Facilities: School Level

Existing Scenario					Desired Level as per URDPFI guideline	Short Term		Medium Term		Long Term		LAND REQUIREMENT AS PER FUTURE NEED							
Sl. No.	Particular	Indicator Unit (number)	Current Level (2011)	Current Gap		2021		2031		2045		Area Require (Ha)		Short Term		Medium Term		Long Term	
						Demand	Gap	Demand	Gap	Demand	Gap	Total Gap	Area Require (Ha)	Total Gap	Area Require (Ha)	Total Gap	Area Require (Ha)		
1.	Population		298680		346140		392696		464221					52	4.16	19	1.52	28	2.24
2.	School													49	19.6	9	3.6	14	5.6
		Pre-Primary, Nursery School	86	1	138	52	157	19	185	28	0.08 ha			52	4.16	19	1.52	28	2.24
		Primary School (Class I - V)	20	1	69	49	78	9	92	14	0.40 Ha			49	19.6	9	3.6	14	5.6
		Secondary School (VI - XII)	38	1	46	8	52	6	61	9	1.80 Ha			8	14.4	6	10.8	9	16.2
		Integrated School without hostel facility (I - XII)	0	0	3	3	4	1	4	0	3.50 Ha			3	10.5	1	3.5	0	0
		Integrated School with hostel facility (I - XII)	0	0	3	3	4	1	4	0	3.90 Ha			3	11.7	1	3.9	0	0
		School for physically challenged	-		0	0	0	0	1	1	0.70 Ha			0	0	0	0	1	0.7
		School for Mentally challenged	-	0	0	0	0	0	1	1	0.20 Ha			0	0	0	0	1	0.2

Table 174: Demand-Supply Gap Assessment of Educational Facilities: College level

Existing Scenario					Desired Level as per URDPFI guideline	Short Term		Medium Term		Long Term		LAND REQUIREMENT AS PER FUTURE NEED							
Sl. No.	Particular	Indicator (number)	Current Level (2011)	Current Gap		2021		2031		2045		Area Require (Ha)	Short Term		Medium Term		Long Term		
						Demand and	Gap	Demand and	Gap	Demand and	Gap		Gap	Total Area Require (Ha)	Gap	Total Area Require (Ha)	Gap	Total Area Require (Ha)	
1.	Population		298680		346140		392696		464221				4	20	0	0	1	5	
2.	Collage												5.00 Ha	4	20	0	0	1	5
		College	37		3	4	3	0	4	1	10.00 to 60.00 Ha		1	10	0	0	1	10	
		University Campus											4.00 Ha	0	0	1	4	1	4
		ITI's/Vocational Training	1		3	0	4	1	5	1			4.00 Ha	0	0	0	0	0	0
		Polytechnic	-		0	0	0	0	0	0			4.00 Ha	0	0	0	0	0	0
		Engineering College	-		3	0	4	1	5	1			6.00 Ha	0	0	1	6	1	6
		Medical College	-		3	0	4	1	5	1			15.00 Ha	0	0	1	15	1	15
		Other Professional Colleges	-		0	0	0	0	0	0			2.00 Ha	0	0	0	0	0	0
		Nursing and Paramedical Institute	1		0	0	0	0	0	0			2000 sqm	0	0	0	0	0	0

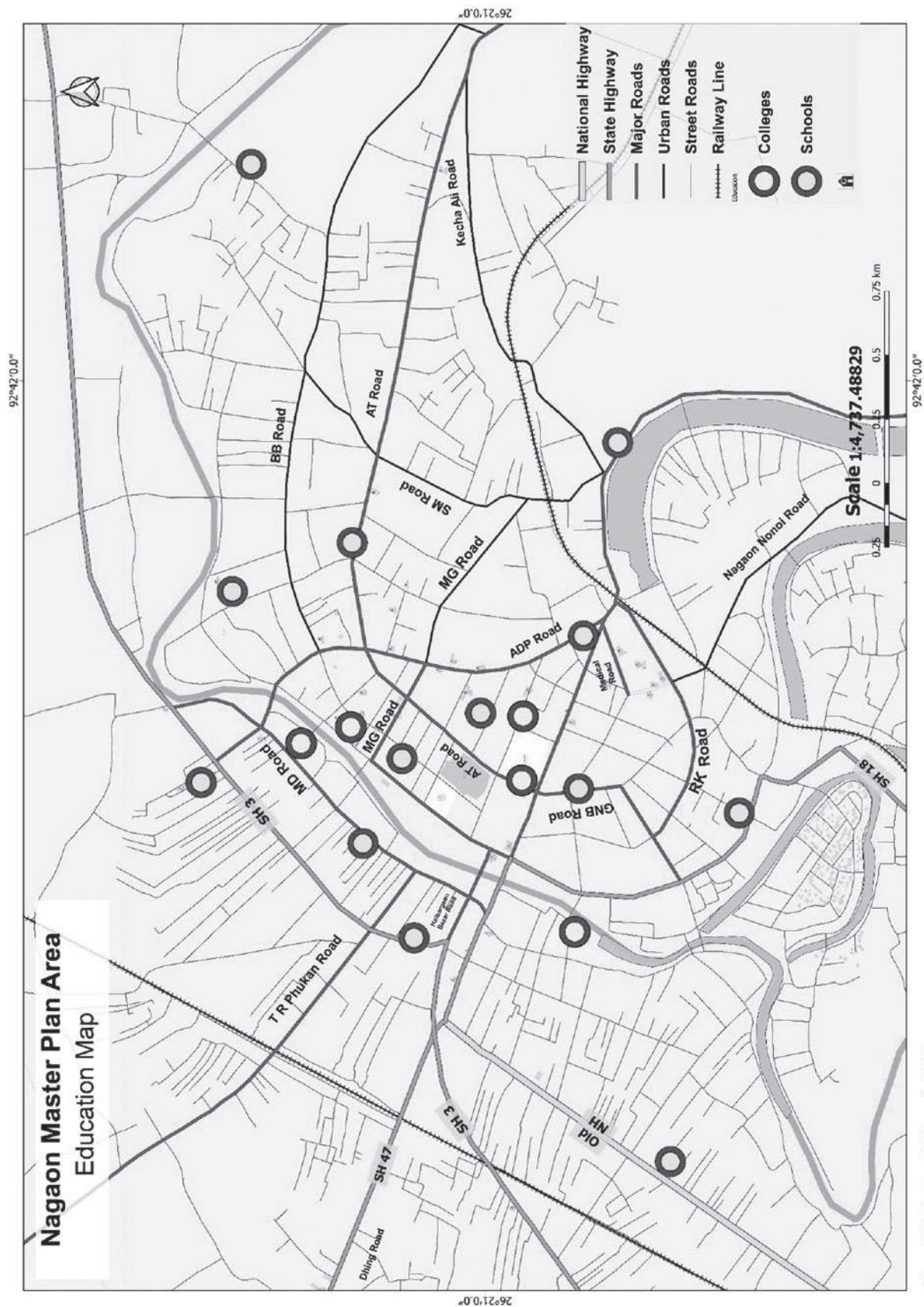


Figure 143 Schools and Collages in NMFA

7.2.1.4 Summary of Educational Facilities Requirement

The demand of various Educational Facilities for the year 2045 is mentioned below in the table 175. The calculations are done based on URDPFI Guidelines

Table 175: Demand of Educational Facilities & Land Requirement for 2045

Sl. No.	Particular	Demand in 2045	Land required in 2045 (Ha)
1	Pre-Primary, Nursery School	28	7.92
2	Primary School (Class I - V)	63	28.8
3	Senior Secondary School (VI - XII)	23	41.4
4	Integrated School without hostel facility (I - XII)	4	14
5	Integrated School with hostel facility (I - XII)	4	15.6
6	School for physically challenged	1	0.7
7	College	5	25
8	University Campus	2	20
9	ITIs / Vocational Training	2	8
10	Polytechnic	0	0
11	Engineering College	2	12
12	Medical College	2	30
13	Other Professional Colleges	0	0
14	Nursing and Paramedical Institute	0	0

Source: Compiled by Consultant)

Based on the area requirement for each unit, land requirement for the above mentioned educational facilities is worked out. There will be a need of 155 Ha. of land for the above mentioned educational facilities.

7.2.1.5 Proposed Strategies

- As the process of Educational department recruitment should be consolidate to make sure only highly skilled teachers are recruited.
- More infrastructural facilities like public library, laboratory, and computers should be provided to schools to enhance the pupil's learning.
- There is a need to set up more schools in villages and out growths of the planning area to improve the people's access to educational facilities.
- Welfare for the differently-abled children should be given due emphasis by setting up special learning schools for them.
- Special emphasis should be laid on technical and skill based vocational education.
- More jobs oriented vocational courses should be introduced by utilizing the existing infrastructure facilities of polytechnic institutions.
- Keeping in view, the influence zone of Nagaon, it is suggested that more emphasis should be laid on professional education, thus more number of professional institutes are proposed for future development.
- Looking in to the potential of area, Knowledge District is been proposed in region.

7.2.2 MEDICAL

The existing health facilities in Nagaon include primary health centre, government and private hospitals, eye hospital, veterinary hospital, national polio surveillance centre and nursing homes. These facilities have been set up by both public and private sector organisations, although, the key medical facilities in the area are provided by private sector.

7.2.2.1 Current Scenario

Table 176: Existing Health Facilities of Nagaon Master Plan Area

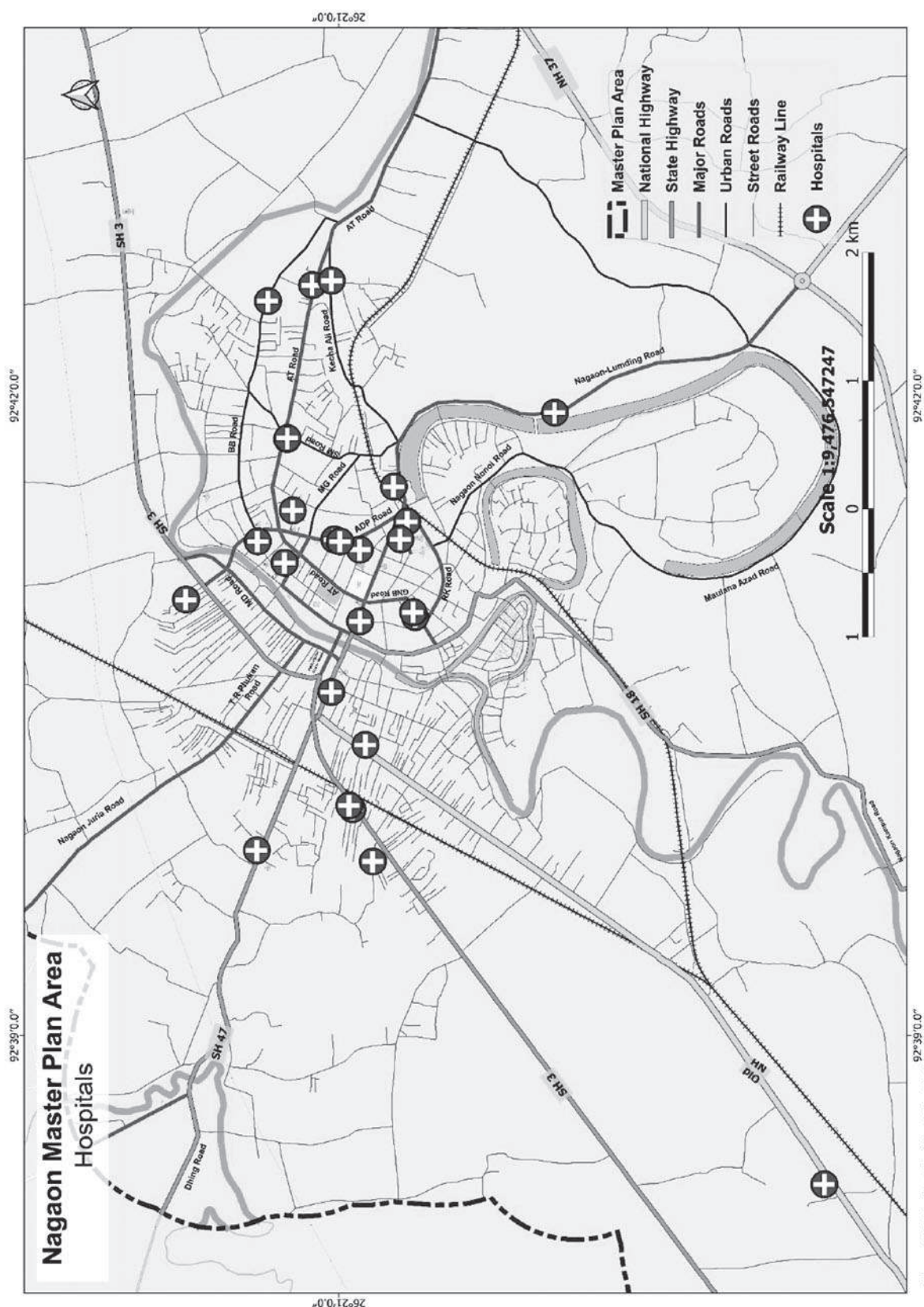
Sr. No.	Health facility in NPA	Number (as per Census 2011)	
		Govt.	Private
1.	Dispensary	78	-
2.	Nursing home, child welfare and maternity centre	-	12
3.	Polyclinic	-	-
4.	Intermediate Hospital (Category B)	-	-
5.	Intermediate Hospital (Category A)	-	-
6.	Multi-Specialty Hospital	-	-
7.	Specialty Hospital	-	-
8.	General Hospital	1	-
9.	Family Welfare Centre	-	-
10.	Diagnostic centre	-	48
11.	Veterinary Hospital for pets and animals	-	-
12.	Dispensary for pet animals and birds	-	-

Source: Joint Director, Health Services, Nagaon, 2020)



7.2.2.2 Health Facility Demand Projection

Existing Scenario					Desired Level as per URDPFI guideline	Short Term		Medium Term		Long Term		Land Requirement as Per Future Need							
Sr. No.	Particular	Indicator Unit (number)	Current Level (2011)	Current Gap		2021		2031		2045		Area Require (Ha)	Short Term		Medium Term		Long Term		
			298680			Demand	Gap	Demand	Gap	Demand	Gap		Gap	Total Area Require (Ha)	Gap	Total Area Require (Ha)	Gap	Total Area Require (Ha)	
1.	Population		298680			346140		392696		464221			2021		2031		2045		
2.	Hospital																		
																		</	



7.2.2.3 Summary of Health Facilities Requirements*Table 178: Demand of Health Facilities & Land Requirement for 2045*

Sr. No.	Particular	Demand in 2045
1.	Dispensary	0
2.	Nursing home, child welfare and maternity centre	0
3.	Polyclinic	5
4.	Intermediate Hospital (Category B)	5
5.	Intermediate Hospital (Category A)	5
6.	Multi-Specialty Hospital	5
7.	Specialty Hospital	5
8.	General Hospital	1
9.	Family Welfare Centre	9
10.	Diagnostic centre	0
11.	Veterinary Hospital for pets and animals	1

(Source: Compiled by Consultant)

Based on the URDPFI Guidelines 2015, the demand of health facilities in 2045 for Nagaon Planning Area is worked out. There will be a need of 1 General hospital, 05 Polyclinics, 10 Intermediate Hospitals, 5 Special Hospitals and 1 veterinary hospitals for pets and animals till 2045. This shall be spatially distributed in the planning area. Based on the area requirement for each unit, land requirement for the above-mentioned health facilities is worked out. There will be a need of 89.24 Ha. of land for the above-mentioned health facilities.

7.2.2.4 Proposed Strategies

Some important measures that can be taken up by appropriate authority to augment and improve the Health care system and facilities in Nagaon Planning area:

The rural health system has to be improve the medical services. Government agencies carrying out the planning and implementation of the initiatives in medical services have to be provided with enough funds to upgrade the existing medical infrastructure in the government hospitals and for modernization medical equipment's.

- It is also important to cater to needs and welfare of the elderly and differently-abled residents of the area. Thus, old Age Home-cum-Care Centre for Senior Citizens and Mentally Challenged should be appropriately set-up.
- Introduction of new technology like provision of multi specialty facilities and equipments etc. in the hospitals and primary health centers.
- There is requirement for training centers for nurses and paramedical staff like pathology, pharmacy may be started to train local and regional students.
- There is a need for the up-gradation of existing hospital, Clinics, Nursing Homes, etc in the planning area especially those publically owned.
- Setting up of dispensaries in rural parts of the planning area which are currently absent.

7.2.3 OTHER SOCIAL INFRASTRUCTURAL FACILITIES REQUIREMENT

Other social infrastructure facilities like commercial centres; Socio-Cultural facilities, library, milk booths, LPG Go-downs, Police stations, Post Office, Fire stations, etc.; Recreational facilities like parks, Multi-Purpose Grounds, sports facilities, etc. are also essential for the balanced development of the planning area and improving the quality of life of the its residents.

7.2.3.1 Other social infrastructure Demand Projection

Table 179: Existing and Future assessment of social infrastructure facilities

Category	Population served per unit	Area Requirement	Requirment	Existing	Future Requirement (2045)	Future Area Required (Ha)
Anganwadi - Housing area/cluster	5000	0.02-0.03 Ha	93	34	59	1.79
Community Room	5000	0.0750 sqm	93	0	93	6.9
Community hall, Mangalkaryayala, barat ghar/library	15000	2000 sqm	31	2	29	5.8
Music, dance, and drama centre	1 lakh	1000 sqm	5	2	3	3
Meditation and spiritual Centre	1 lakh	5000 sqm	5	0	5	2.5
Recreational Club	1 lakh	Max. 1000 sqm,	5	0	5	0.5
Old age home	5 lakhs	0.03	1	1	0	0
Religious Facilities						
At Neighbourhood /Housing cluster level	5000	400 sqm	93	0	93	3.72
At sub city level in urban extension	10 lakhs	4.00 Ha	0	0	0	0
Other Facilities						
Orphanage/ Children's Centre one each	10 lakhs	Max. 1000 sqm,	0	1	0	0
Care centre for physically /mentally challenged	10 lakhs	Max. 1000 sqm,	0	0	0	0
Working women – men hostel	10 lakhs	Max. 1000 sqm,	0	1	0	0
Adult education centre	10 lakhs	Max. 1000 sqm,	0	0	0	0
Night Shelter	10 lakhs	Max. 1000 sqm,	0	0	0	0
Socio – Cultural centre/Exhibition cum fair ground	10 lakhs	15 Ha	0	0	0	0
Science Centre	10 lakhs	As per requirement	0	0	0	0
International Convention	City level	As per requirement	0	0	0	0

7.2.4 PARKS & OPEN SPACES

Table 180 Existing and future assessment of open spaces.

Category	Population served per unit	Area Requirement (Ha)	Require ment	Existing	Future Requirement (2045)	Future Required Area
Housing Area Park	5000	0.50 to 1.00	93	98	41	41
Neighbourhood Park	10000	1.20 to 2.00	46			
City Parks/ playgrounds/ maidan/exhibition grounds/ cultural gathering grounds	1 for every town	-	-	0	1	3
Botanical Garden	1 for every town	10.00 to 20.00	-	0	1	10
Recreational complex including zoo	1 for every settlement with tourist potential	10.00 to 12.00	-	0	0	0

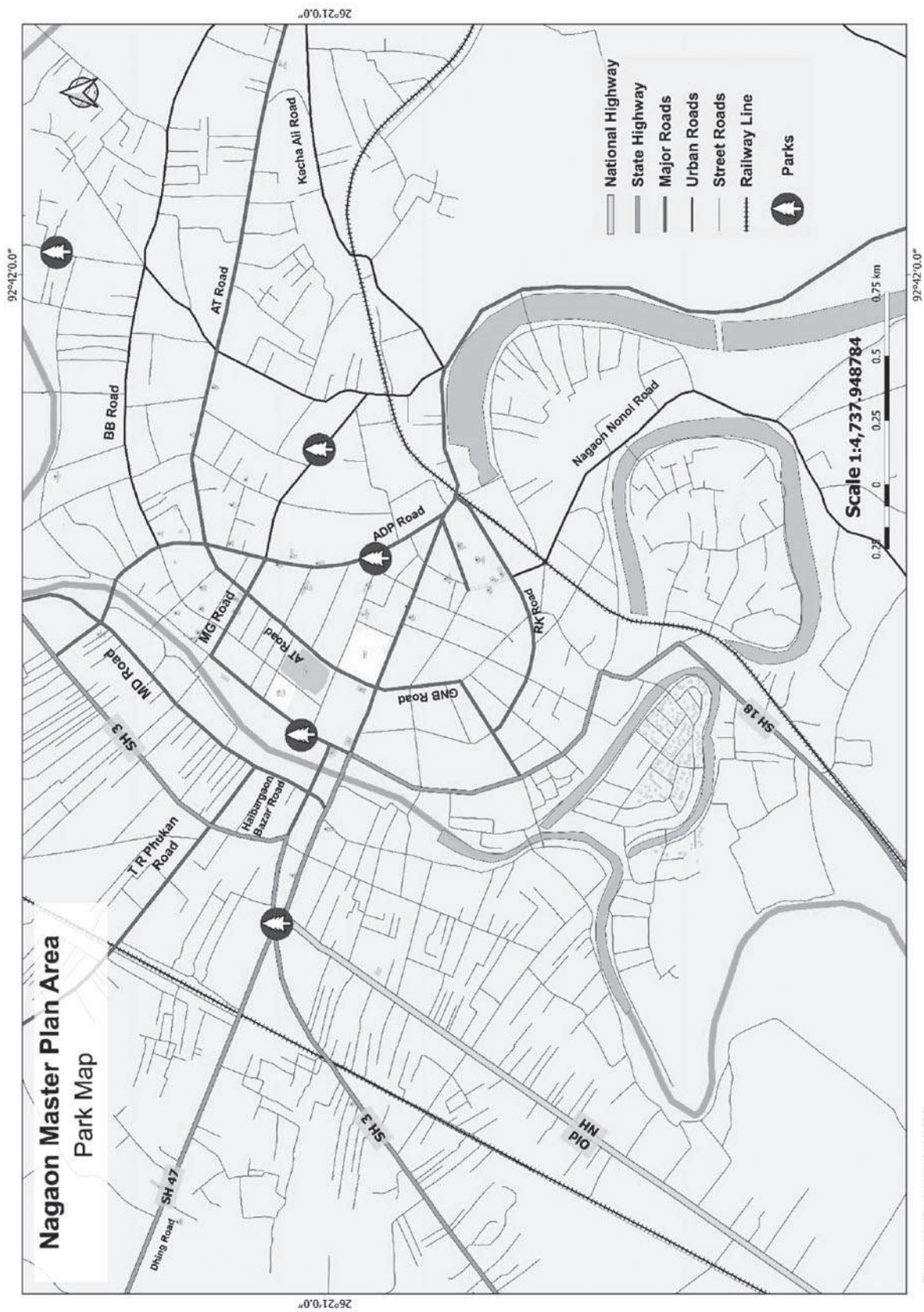


Figure 14s Parks within NMPA

7.2.5 MULTI-PURPOSE GROUNDS AND SPORTS FACILITIES REQUIRED

Table 181 Existing and future assessment of multipurpose grounds and sports facilities

Category	Population served per unit	Area Requirement (Ha)	Requirement	Existing	Future Requirement (2045)	Future Required Area
Sub city level multipurpose ground	10 lakhs	8	0	0	0	0
District level multipurpose ground	5 lakhs	4	1	0	1	4 Ha
Community level Multipurpose ground	1 lakh	2	5	0	5	10 Ha
Residential unit play area	5,000	0.5 Ha	93	0	93	46.5 Ha
Neighbourhood Play area	15,000	1.50 Ha	31	0	31	46.5 Ha
District Sports Centre	1 lakh	8.00 Ha	5	0	5	40 Ha
Divisional Sports Centre	10 lakhs	20.00 Ha	0	0	0	0

7.2.6 COMMUNITY FACILITIES

7.2.6.1 Existing Communities and other Facilities

Table 182: Existing Communities Facilities

Sr. No.	Facilities	Numbers
1	Corporation Gardens	1
2	Community Hall	1
3	Swimming Pool	1
4	Corporation Playgrounds	1
5	Gymnasia	Nil
6	Corporation Stadium	Nil
7	Cinemas	Nil
8	Open Air Theatres	1
9	Zoo	Nil
10	Public libraries	1
11	Art Galleries	Nil
12	Museum	1
13	Other (specify)	1
14	Fire Services	1
	No. of Fire stations	1
	No. of fire tenders	5
	Personnel	22
15	Cremation/Burial Ground	7
16	Petrol/Gas Station	10
17	Hotels and Eating Places	51

(Source: Nagaon Municipal Board)

7.2.6.1 Existing and Future assessment of Community facilities

Table 183: Existing and Future assessment of community facilities.

Category	Population served per unit	Area Requirement (Ha)	Requirement	Existing	Future Requirement (2045)	Future Required Area
Milk Booths	5000	0.015	137	28	109	1.64ha
LPG Godowns	50000	0.2	14	0	14	2.8ha
Police Station	90000	1.5	8	2	6	7.5ha
Police Post	40000	0.16	18	7	11	1.76ha
District Jail	1000000	10	0	0	0	0
Fire Station	200000	1	3	1	2	2ha
Sub Fire Station	within 3-4km radius	0.6	0	0	0	0
Disaster Management Centre	One in each administrative zone	1	1	1	0	0
Post Office	15000	0.6	46	9	37	22.2ha
Graveyard / Burial Ground	10000	1	68	7	54	54ha

(Source: Compiled by Consultant)

7.2.7 COMMERCIAL FACILITIES**7.2.7.1 Existing Commercial Facilities**

Table 184: Existing Commercial Facilities

Year	Hotel	Restaurant	Wholesale	Retail shop
2011	-	-	-	-
2012	-	-	-	-
(up to 2019)	51	400	-	-

(Source: Nagaon Municipal Board)

7.2.7.2 Existing and Future assessment of Community facilities

Table 185: Existing and future assessment of commercial facilities.

Category	Population served per unit	Area Requirement (Ha)	Requirement	Existing	Future Requirement (2045)	Future Required Area
Convenience Shopping	5000	0.15	137	28	109	16.35ha
Local shopping including service centre	15000	0.46	46	9	37	17.36ha
Community centre with service centre	100000	5	7	-	7	35ha
District centre	500000	1	1	-	1	1ha

(Source: Compiled by Consultant)

7.2.8 BANKS/FINANCIAL INSTITUTIONS

The entire planning area is served by 24 nos. of banks, out of which 23 nos. of banks are in Nagaon town and 1 is located at Bebejia Chariali. The banks located within the planning area are shown in the table below:

Table 186 Banks in NMPA

Sl. No.	Name of banks	No. of banks
1	State bank of India	3 nos
2	Union Bank of India	1 nos
3	United Bank of India	2 nos
4	Canara Bank	1 no
5	Punjab National Bank	1 no
6	Central Bank OD India	2 nos
7	Indian Bank	1 no
8	UCO Bank	1 no
9	Assam Gramin Bikash Bank	4 nos
10	Apex Bank	1 no
11	Canara Bank	1 no
12	Lead Bank	1 no
13	Axis Bank	1 no
14	Bank of Boroda	1 no

7.2.9 POST OFFICE

There are 6 post offices within Nagaon Revised Master Plan Area. One is head post office located near Deputy commissioner's Office, Nagaon 4 sub post offices are located within Nagaon town area and remaining one is located at Bebeji and one is at Barghat.

7.2.10 FIRE STATION

There is one fire station located at Fouzdari patty to take care of fire hazards of the planning area.



8 CULTURE & HERITAGE

8.1 CULTURE OF NAGAON

The present district of Nagaon is one of the historically famous districts in the state of Assam of North-East India. Bardowa, the birthplace of the Vaisnava saint and reformer is situated in Nagaon. It has been attracting a quantitatively large number of the population and has become a major tourist spot in recent years. This may be another reason

of housing a good number of Sattras- the seat of Vaisnava learning and cultural development which are scattered in almost whole of the district except Hojai. In recent years it has become one of the culturally affluent districts of Assam cantering round Vaisnava religion and heritage.

8.1.1 SANKARDEV'S CULTURAL VISION AND THE NAGAON SOCIETY

In Sankardev's time, religion was the source of various socio-cultural disparities and depravities, the victims of which were the so-called low castes and backward communities. The dregs of Varnasram Dharma in the form of the caste system deprived the Sudras from many rights including the right to religious practices. Simultaneously, the tantric section of the Buddhists indulged themselves in various bacchanalian practices polluting the social atmosphere. The person who came forward at that juncture to shoulder the historic responsibility of upholding before the Assamese society the right path of cultural uplift was Mahapurush Srimanta Sankardev.

Before the emergence of Shrimanta Sankardeva, the most power religious cults in Assam were Saivism and Saktism.

8.1.1.1 Religious form of Music and Dance

Srimanta Sankardev created a new classical school of music, known as Sankari music with his Bargeet. These Bargeet songs are one of the main modes of conveying the principles of the Ek Sarana Nama Dharma, founded by the saint. Sankari music is one of the three major classical schools of music in India, the other two being the Hindustani and Carnatic music. In fact, the development of Sankari music was even older than Hindustani music, the grammar of which was systematically recorded only in the twentieth century by Bhatkhande. Srimanta Sankardev belonged to an earlier period than Tansen, Man Singh Tomar etc, the major contributors of Hindustani music.

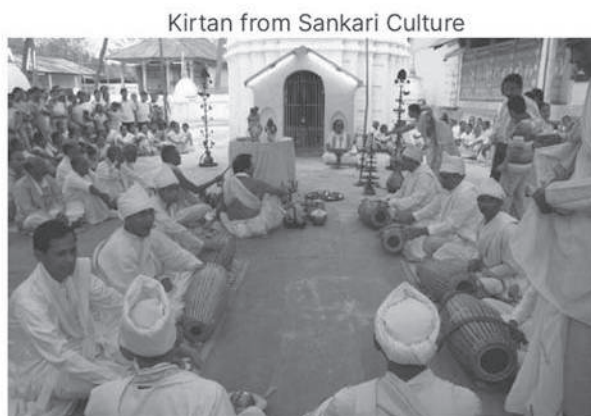
The method of singing in Sankari school of music differ a lot from both the Hindustani and the Carnatic schools. For instance, the extensive rise and fall all over the scales along the path of a Raga is a unique

character of Bargeet, the devotional songs composed by Srimanta Sankardev and his foremost disciple Madhavadeva. They called the first verse in every Bargeet as Dhrung, which means constant. This concept is a basic requirement in classical music. (Source: Dr. Sanjeev kumar borkakati)



8.1.1.2 *Tales and Ragas*

Srimanta Sankardev created twenty-five Raga for his Bargeet, a unique group of devotional songs. These were Ashowari, Dhanashree, Gouri, Suhai, Basanta, Sri, Kedar, Mahur Dhanashri, Tur Basanta, Kalyan, Ahir, Mahur, Bhatiyali, Sindhura, Nat, Belowar, Sri Gandhara, Saranga, Nat Mallar, Kow, Shyam, Kanra, Purbi, Sri Gouri, and Tur. His disciple Madhavadeva also composed seven Raga. These were Mallar, Bhupali, Tur Bhatiyali, Barari, Kamod, Syamgara, and Lalit. Though some of these names are similar to the Raga in the Hindustani and the Carnatic schools, the Raga of Srimanta Sankardev and



Kirtan from Sankari Culture



Musical Instrument

Madhavadeva are different from these two schools.

Thirty-two Raga are called Mela Raga, meaning open Raga. That means these can be sung by using any Tala or rhythm. It deserves mention here that the Bargeet does not have any fixed Tala. Some maestros sing a single Bargeet by using several Tala. Moreover, the same Bargeet is sung by using different Tala in Barpeta Than, Bordowa Than and Kamalabari Satra. These three Than and Satra have thus created three sub-schools of the Sankari music

Srimanta Sankardev and his disciples used many instruments in the performance of Sankari music. All these were innovated indigenously. Some of these instruments are Sarengdar, Nagara, Manjira-tal, Khol, and Bhortal. The most famous among these is Khol, which was innovated by Srimanta Sankardev himself in 1468 AD at the time of enacting his first play Chihna Yatra. It was made by a Kachari artisan from Kapili valley at the instruction of the saint. At that time the structure was made of baked earth, but nowadays it is made of wood. The diametre on two sides are

respectively 9.75 inches and 5.25 inches. These are covered with cowhide. A paste of iron dust and rice is put on it. It is called Ghun.

The popular instrument (drum) Nagara, which is used in community prayer sessions, is also a contribution of the Tiwa people. However, it came to be used after the demise of Srimanta Sankardev only. Another instrument of the Tiwas, the Ludang khram is very much akin to Khol. It may be mentioned that though Khol was innovated to some extent from the ancient Mridanga, the accoustic property of Khol differ a lot from Mridanga. It is pertinent here that the Kachari tribe also has an ancient tradition of playing Dhol or drum. In fact, the Gayan-Bayan tradition itself has been derived from the Sonowal Kachari tribe. An ancient sculpture has been found in the Na-Nath temple of the Kapili valley, where a drum is being played.

8.1.1.3 *Sattriya Dance*

The Sattriya dance form was introduced in the 15th century A.D by the great Vaishnava saint and reformer of Assam, Mahapurusha Sankardev as a powerful medium for propagation of the Vaishnava faith. The dance form evolved and expanded as a distinctive style of dance later. This neo-Vaishnava treasure of Assamese dance and drama has been, for centuries, nurtured and preserved with great commitment by the Sattras i.e., Vaishnava or monasteries. Because of its religious character and association with the Sattras, this dance style has been aptly named Sattriya.

Sattriya dance tradition is governed by strictly laid down principles in respect of hastamudras, footworks, aharyas, music etc. This tradition, has two distinctly separate streams - the Bhaona-related repertoire starting

from the Gayan-Bhayanar Nach to the Kharmanar Nach, secondly the dance numbers which are independent, such as Chali, Rajagharia Chali, Jhumura, Nadu Bhangi etc. Among them the Chali is characterized by gracefulness and elegance, while the Jhumura is marked by vigor and majestic beauty.

Sankardev introduced this dance form by incorporating different elements from various



Sattriya dance in Borduwa satra

treatises, local folk dances with his own rare outlook. There were two dance forms prevalent in Assam before the neo-Vaishnava movement such as Ojapali and Devadasi with many classical elements. Two varieties of Ojapali dances are still prevalent in Assam i.e., Sukananni or Maroi Goa Ojah and Vyah Goa Ojah. Sukananni Oja paali is of Sakti cult and Vyah Goa Oja paali is of Vaishnava cult. Sankardev included Vyah Goa Ojah into his daily rituals in Sattras. Till now Vyah Goa Ojah is a part of rituals of the Sattras of Assam. The dancers in a Oja paali chorus not only sing and dance but also explain the narration by gestures and stylized movements. As far as Devadasi dance is concerned, resemblance of a good number of rhythmic syllables and dance postures along with footwork with Sattriya dance is a clear indication of the influence of the former on the latter. Other visible influences on Sattriya dance are those from Assamese folk dances namely Bihu, Bodos etc. Many hand gestures and rhythmic syllables are strikingly similar in these dance forms. **(Source: Center of cultural resources and training)**



Sattriya dance depiction of Bhagvad gita

8.1.1.4 The Sankari Art

Among the different art forms, the art of manuscript painting was also practiced and maintained traditionally in the Satras. The skill and quality of artists and their aesthetic sense of vision were executed through this medium visual art. The paintings were made following a traditional technical process of preparation using natural ingredients and colours.



The manuscripts were three to four hundred years old but still looking fresh and glazing which is also a significant characteristic of Satriya paintings. The paintings of Bhagavata-Purana, X, is the best example of the satriya style of traditional painting. The precursor of Neo-Visnavism, Srimanta Sankardeva was responsible for the development of painting tradition in the medieval history of Assam.



Srimanta Sankardeva

Manuscripts Painting

The alive or existing proofs of art of practicing manuscript painting in Assam was date back to the time of Bhakti- movement headed by Vaishnava saint Srimanta Sankardeva (1449-1569) and his direct disciple Madhavdeva. The Sankardevas initiation of this art of manuscript painting was remain a most significant visual learning system in medieval Assam.

The work of this art is also representing the patience and intellectuality of the unknown master artist of the medieval traditional school of paintings. The paintings also generate the knowledge traditional science &

craftsmanship which depends on natural ingredients of making surface for painting like Tulapat & Sanchipat with simplification in representation of a subject in visual form rather than any kind of confusing representation.

There are mostly three types of masks that are made at the Samaguri Satra viz. 'Mukha' – face masks, 'Lotokai Mukha' – masks to move lips, eyes, hands, etc. and the 'Bor Mukha' – life size or even larger masks. The frame is generally built of bamboo but sometimes even paper is used to make these masks.

(Source: A traditional art practice, Sri Bkram Sakar)



Masks in Samaguri Satra

8.2 HERITAGE

Conservation of buildings, artefacts, structures, areas and precincts of Historic, aesthetic, architectural, cultural significance (Heritage buildings and heritage precincts) will fall under the norms prescribed by the ASI, would need redevelopment and redesign without hampering the fabric of area. Following are the tangible and intangible identified heritage site which fall under the National, Regional and Local context levels.

8.2.1 REGIONAL LEVEL HERITAGE

8.2.1.1 District library

The concept of library comes into existence with the interest of people to preserve their knowledge for their future generation. Sankardeva had established 'Satras' which is a place for religious practice as well as it acts like a source of informal education for the illiterate people. So, it can be called the older version of modern public library. Later, British rulers had also established some libraries in major district headquarters of Assam, where Central Library of Nagaon is one of them.



8.2.1.2 Narowa Satra and Salaguri Satra



Bordowa also referred to as Batadrava is situated 18 km north west of Nagaon. It is the birthplace of the revered Vaishavite saint of Assam Srimanta Shankardev. Famous for its two satras, namely the Narowa Satra and Salaguri Satra, the town is a collage of Assam's rich religious history. It is believed that the satras were founded when Srimanta Sankardeva returned from his first pilgrimage in 1494. He named the shrine as Thaan, for propagating the principle of one god, one mind and one soul. The satra at Bordowa is a major religious center for Vaisnava devotees from around the state. The Narowa Kuji Satra in Nagaon –Morigaon border area geographically Morigaon district occupies an area under Dolongghat Development Block. The Satras are institutional centers associated with the Ekasarana tradition of Vaishnavism. Narowa Kurjistra Historical Mandir.

8.2.1.3 Minaret Puranigudam

The century old Minaret in Puranigudam Masjid is famous for the community efforts and unity for its shifting and preserving. The shifting was done to pave way for the four-lane highway in the area. The whole process of minaret shifting has been done within a month. Earlier, people of Puranigudam had decided to preserve the century old minaret and the two-storey minaret near the NH 37 in Puranigudam was gradually shifted from its original site with the help of modern technology.



8.2.1.4 Central Jail

Spread over 36 Bigha 04 Kotha and 14 lecha of land in the heart of Nagaon city, this Special Jail was established in the year 1898 as District Jail and subsequently upgraded to Central Jail in the year 2002, presently known as Central Jail Nagaon.



8.2.1.5 Daul Temple



Locate 17 km far on North-West side of Nagaon, Daul Temple is famous religious place for Krishna's idol. In Bordowa Sankardeva first drama "Chihna yatra" was staged at the present site of Daul Mandir. He played the musical instruments by himself. "Chihna yatra" was played continuously for seven days. During "Daul Utsav", Lord Krishna's idol is taken to Daul Mandir and it serves as "Ghunusha griha".

8.2.2 LOCAL LEVEL HERITAGE

8.2.2.1 Nowgong Mission high school

Established in 1846 at the time of British Rule, Nowgong Mission High School is a historical educational Institution of Assam. The school was established by American Baptist Missionary Rev. Miles Bronson. It was initially the 1st Women Educational Institution. Now it is a co-educational Institution.



Table 187: Tangible and Intangible Heritage

Context level	Tangible Heritage	Intangible Heritage
National	Not identified	Ranthali Jewelry Cluster, Nagaon. Ankia Bhaona (one act play). These plays are popularly known as Ankia Nats and staging is known as Bhaona. Weaving (Muga Silk) is a traditional household activity. Nonoi Tea Estate (35 km from the town).
Regional	<ul style="list-style-type: none"> District Library (1955) Narowa Sattrā and Salaguri Sattrā (Bordowa) Minaret of Puranigudam (15 km from the town) Central Jail (1950) 	Bordowa Than (15 km from the town) is birthplace of Sri Sankardev. Manufacturing of Kuhila craft, Pottery & Terracotta, Jute, Cane & Bamboo products.
Local	<ul style="list-style-type: none"> Nowgong Mission High School (1846). Jayashree Cinema Hall (1944) Nikamul Uriagaon Sattrā Karchung Sattrā Special Jail (1898) 	Not identified

8.3 ISSUES

Dilapidated Condition of structures: Most of the heritage structures are in dilapidated condition due to the unavailability of conservation, restoration and preservation practices in Nagaon area. These structures need periodic preservatory treatments in order to enhance their cultural life for coming generations.

Unavailability of Infrastructure and Services: There is an absolute absence of proper infrastructure and services in the immediate areas around the possible heritage as well as tourist spots of Nagaon. The basic tourist amenities also lack at these places which have to be planned accordingly.

Absence of Monitoring: There is no nodal body responsible for periodic monitoring of the heritage structure around Nagaon. Such nodal bodies are to be constituted in order to provide proper jurisdiction to such capable heritage areas so that there's no threat to them in future.

Haphazard Development: The unplanned developmental activities around the heritage sites are serious threats and it harms the integrity of the heritage structures. Such activities are to be monitored by a proper administrative framework under by the local, regional or state authorities.

Lack of Awareness among Public: The citizens are unaware about the cultural assets owned by them and they are to be made aware in order to have proper public participation in order to preserve such important historic sites. Public participation is an utmost important aspect for the conservation of any site.

Absence of Legal Plan: There is an absence of a visionary master plan available specifically for the heritage sites in Nagaon. Such important sites require a separate space in the administrative framework of the authorities in the form of a legal document which has been prepared after consulting proper stakeholders and experts.

Documentation of Heritage Structure: The heritage structures of Nagaon region are not documented till date. There is a need of proper listing and documentation of heritage sites in Nagaon. Such sites are to be properly listed under various grades of their importance and documented specifically so that a proper conservation approach can be implemented for such important sites.

8.4 PROPOSED STRATEGIES

8.4.1 HERITAGE MANAGEMENT AND ORGANIZATIONAL STRUCTURE

There is a need to setup a Heritage Committee for Nagaon Panning Area. The concerned Development Authorities/municipalities as well as local stakeholders, NGOs have significant role to play in successful implementation of strategies proposed for Nagaon's Areas.

Formulations of special regulations to control or mediate development within the available heritage areas are a prerequisite for effective implementation of the proposed recommendations. Special regulations for all development within heritage areas, including new construction, demolition or modification to existing buildings around historic structures or within historic precincts must be formulated by the concerned authority with the advice of Heritage

Committee.

Detail plans must be prepared by respective development Authorities and Municipalities. It is necessary to prepare an inventory of built, cultural and natural heritage resources of the special areas. The inventory must include both protected and unprotected resources. The cost for most of the new developments in special heritage areas is already covered in budget allocation for 'Tourism, Recreation and Culture' and hence not included in this table. Estimates for projects those are specific for preservation of heritage resources are only included. River Front Development is treated as a separate item of budgetary allocation.

8.4.2 HERITAGE CONSERVATION PROPOSAL



Figure 146 Heritage Conservation process

Where to start	Institutional setup	Special Control Areas
<ul style="list-style-type: none"> • Listing of buildings • Locating on city map • Form clusters of significant buildings • Name as Heritage Zone/ Conservation Zone 	<ul style="list-style-type: none"> • Institutions responsible for maintenance – ULB, PPA, TCPD, ASI, state Depts. • Inter institution linkages – ULB, ASI, INTACH • Heritage Cell • Civil society groups/industrial house 	<ul style="list-style-type: none"> • For heritage structures and precincts • Controlled Development • Heritage Conservation Committee

Figure 147 Heritage Conservation Chart

The primary objective of listing is to record extant architectural heritage and sites and the outcome of this process should invariably be to grade the heritage by a multidisciplinary team of experts whose recommendations should be available for public stakeholders and they can assess those for further changes if required. The importance of this process cannot be underestimated because its results determine subsequent conservation decisions and it facilitates the prioritisation of decisions relating to the future of architectural heritage and sites.

Listing does not prevent change of ownership or usage but change of use of such Listed Heritage Building / Listed Precincts is not permitted without the prior approval of the Heritage Conservation Committee. Listed Heritage Buildings / Listed Heritage Precincts may be graded into three categories. The definition of these and basic guidelines for development permissions are as follows:

Table 188: Heritage Building Category and Grading

Grade-I	Grade-II	Grade-III
(A) Definition: Heritage Grade-I comprises buildings and precincts of national or historic importance, embodying excellence in architectural style, design, technology and material usage and/or aesthetics; they may be associated with a great historic event, personality, movement or institution. They have been and are the prime landmarks of the region. All-natural sites shall fall within Grade-I.	Heritage Grade-II (A&B) comprises of buildings and precincts of regional or local importance possessing special architectural or aesthetic merit, or cultural or historical significance though of a lower scale than Heritage Grade-I. They are local landmarks, which contribute to the image and identity of the region. They may be the work of master craftsmen or may be models of proportion and ornamentation or designed to suit a particular climate.	Heritage Grade-III comprises building and precincts of importance for townscape; that evoke architectural, aesthetic, or sociological interest through not as much as in Heritage Grade-II. These contribute to determine the character of the locality and can be representative of lifestyle of a particular community or region and may also be distinguished by setting, or special character of the façade and uniformity of height, width and scale.
(B) Objective: Heritage Grade-I richly deserves careful preservation.	Heritage Grade-II deserves intelligent conservation	Heritage Grade-II deserves intelligent conservation (though on a lesser scale than Grade-II and special protection to unique features and attributes).
(C) Scope for Changes: No interventions be permitted either on exterior or interior of the heritage building or natural features unless it is necessary in the interest of strengthening and prolonging the life of the buildings/or precincts or any part or features thereof. For this purpose, absolutely essential and minimum changes would be allowed and they must be in conformity with the original.	Grade-II(A) : Internal changes and adaptive re-use may by and large be allowed but subject to strict scrutiny. Care would be taken to ensure the conservation of all special aspects for which it is included in Heritage Grade-II. Grade-II (B) : In addition to the above, extension or additional building in the same plot or compound could in certain circumstances, be allowed provided that the extension / additional building is in harmony with (and does not detract from) the existing heritage building(s) or precincts especially in terms of height and façade	Not Requires
(D) Procedure: Development permission for the changes would be given on the advice of the Heritage Conservation Committee.	Development permission for the changes would be given on the advice of the Heritage Conservation Committee.	Development permission for changes would be given on the advice of the Heritage Conservation Committee.
(E) Vistas / Surrounding Development: All development in areas surrounding Heritage Grade-I shall be regulated and controlled, ensuring that it does not mar the grandeur of, or view from Heritage Grade-I.	All development in areas surrounding Heritage Grade-II shall be regulated and controlled, ensuring that it does not mar the grandeur of, or view from Heritage Grade-II	All development in areas surrounding Heritage Grade-III shall be regulated and controlled, ensuring that it does not mar the grandeur of, or view from Heritage Grade-III.

(Source: CPWD)

For the conservation of heritage buildings, the abovesaid steps are to be followed.

8.4.3 POLICIES ON CULTURAL DEVELOPMENT IN NAGAON

The proposals for propagation and development of Cultural activities at Nagaon include:

- Promotion of Traditional Fairs and Festivals through government and NGOs participation so as to generate awareness among the new generation towards rich cultural heritage and inviting cultural tourism
- Development of a cultural centre at Nagaon with infrastructural development for round the year activities
- Centre for Development of horse dance (Ghora Naach) and handicrafts development and tourism promotion for the region.

8.4.4 UNESCO NOMINATION UNDER THE WORLD HERITAGE SITE

The historic site of Borduwa Satra, birthplace of Sri Sankardeva along with other important sites related to Sri Shankradeva in the state of Assam can be nominated for the World Heritage Site nomination as he was an important social and religious figure who was instrumental in shaping the cultural fabric of Assam which is thriving till date. His literary and artistic contributions are living traditions in Assam today. The religion he preached is practised by a large population, and Sattras (monasteries) that he and his followers established continue to flourish and sustain his legacy.

Thus, Nagaon authorities can take up an initiative with proper experts in preparing a document specifically mentioning the importance of Sri Sankardeva with the reference to his birthplace which can be used for tentative nomination in UNESCO by the state parties.

8.5 CONCLUSION

The relevant policy guidelines and management of cultural and natural heritage can rejuvenate and revitalize the Nagaon region and support the existing cultural identity. It can also promote tourism, boost local economy and contribute a great sense of pride amongst the residents and become a touchstone for future development.

9 TOURISM

9.1 INTRODUCTION

Tourism sector is emerging as the largest service industry for generating employment and boosting economic growth, having forward and backward linkages. There are several reasons for Nagaon district as tourist hub in Assam. Nagaon district has a strategic geographical location. It is located in Central Assam, and is a place of extraordinary scenic beauty, with the mighty Brahmaputra in its north, the Mikir and the Karbi hills in the south. It also connects Arunachal Pradesh, Assam, Meghalaya and Nagaland.

9.2 TOURISM DESTINATIONS

Nagaon, is an excellent spot for the promotion of eco-tourism and natural tourism. The famous Kaziranga National Park which is home for rhinos and tigers is located at travelling distance of only 2 hours from Nagaon Town on the south bank of the Brahmaputra. The other Wildlife Sanctuaries such as Laokhowa- Burhachapori (separated by a channel of the Brahmaputra) and Pobitora, a famous spot for bird watching is easily accessible from Nagaon Town. All these biodiversity hotspots represent a range of ecosystems, including evergreen mixed forest, and freshwater mangrove vegetation. It becomes a very lucrative spot for tourism, especially in winter. Additionally, Nagaon has numerous small and big tea garden which host special place in history. The first tea garden in Nagaon, Loongsoong, came up in 1880's. The tea gardens such as Jiajuri, Saloneh and many others, located at the foothills of the Mikir and the Karbi hills, are places of excellent scenic beauty. Provision of visiting tea garden accompanied by a sip of excellent Assam tea can further enhance the importance of natural tourism.

Eco tourism can also be encouraged in sites like Chapanal waterfalls, also known as Champawati Kund, located in Chapanal town of Nagaon district. Within a two-hour travelling time, in the jurisdiction of Karbi- Anglong District, the picturesque waterfall of Kanthilangso Waterfalls is a nice spot, for a day trip, and for experiencing eco-tourism. It is famous for a mysterious cave, full of bats. This is widely believed by the local Tiwa villagers, to be an ancient village, which was turned by some sorcerer into a cave, and the inhabitants were transformed into bats. This incident is commemorated by an annual fair, held in each winter, by the villagers.

Thirdly, Nagaon has always been considered as the centre of Art, Culture, Literature, and heritage.

It is renowned for being the birthplace of Srimanta Shankar Deva, the founder of medieval Vaishnavite faith in Assam, which was largely egalitarian.

Shankar Deva was born in Bordowa Than, near the present Nagaon town, which was later developed as the Bordowa Satra. Nagaon is also the birthplace of Lakshminath Bezbarua, a prolific writer in modern Assamese language, and a well-known artist. Beside the Vaishnavite cult, Assam has one of the oldest traditions of worshipping of the Goddess, Shakti, which was propagated by the Tantric Cult, and by the Ahom kings. One such ancient site for worshipping Shakti is the Akashiganga Waterfall, which is the largest waterfall in Nagaon. It is one of the 'Sati Pith's. In Akashiganga stream, many people assemble to take bath and worship, during the time of the 'Magh Bihu'. Another such place of worship of 'Kamakhya', as the mother Goddess is known in Assam is in Silghat which was built in 18th century by the Ahom kings. Silghat is also famous for the early 18th century Hatimura Durga temple and the Samantagiri hills, from where a fantastic view of the Brahmaputra may be obtained. A trail through the forests, along the bank of the Brahmaputra, leads to the ancient Shiva temple of Trishuldhari.

Additionally, Nagaon also have several sites of archaeological importance such as Baduli Khurung, Jayantipur Bar Masjid, Jungle Bolohu Fort Channel and Jagijan. Inside the Jiajuri tea estates, still, there can be seen, ancient stone pillars, gates, and water management system, possibly, older than thousand years, when the region was ruled by some unknown tribal rulers. Remnants of their ancient houses can still be noticed.

Lastly, Nagaon is famous for its diverse culture and handicrafts. To learn about the Assamese handicrafts industry, a visit to the Rontholi-Xunari Jewellery

Cluster is a must. Rontholi-Xunari is a small village within a radius of 6 km from Nagaon, where all the households are engaged in making of traditional gold ornaments, which is worn by Assamese women during Bihu dances, and in marriage. The art was once patronized by the local Ahom and Bhuyan kings and is specific only to Rontholi- 'Sonarigaon', or an abode of goldsmiths. In absence of patent rights, or state patronization, the industry is facing heavy competition and is in high risk of eventual annihilation. For an insight into the life and culture of the diverse tribes of Nagaon, trips can be undertaken

to visit the isolated Karbi villages like Amsoi and Bali Chara Dalani, Tiwa Tribe in Roha, Villages of Nagas and Bodos. Much is to learn, from the sustainable lifestyle, led by the tribals. Thus, Nagaon have ample resources, and immense tourism potential, that required to be developed. Fullest development of tourism potential, can lead to economic and social development of the district, in terms of generation of non-farm activities, and rejuvenation of the near stagnant economy, largely dependent on the primary sector

9.2.1 TOURISM DESTINATIONS FROM NAGAON WITHIN 25 KM OF RADIUS

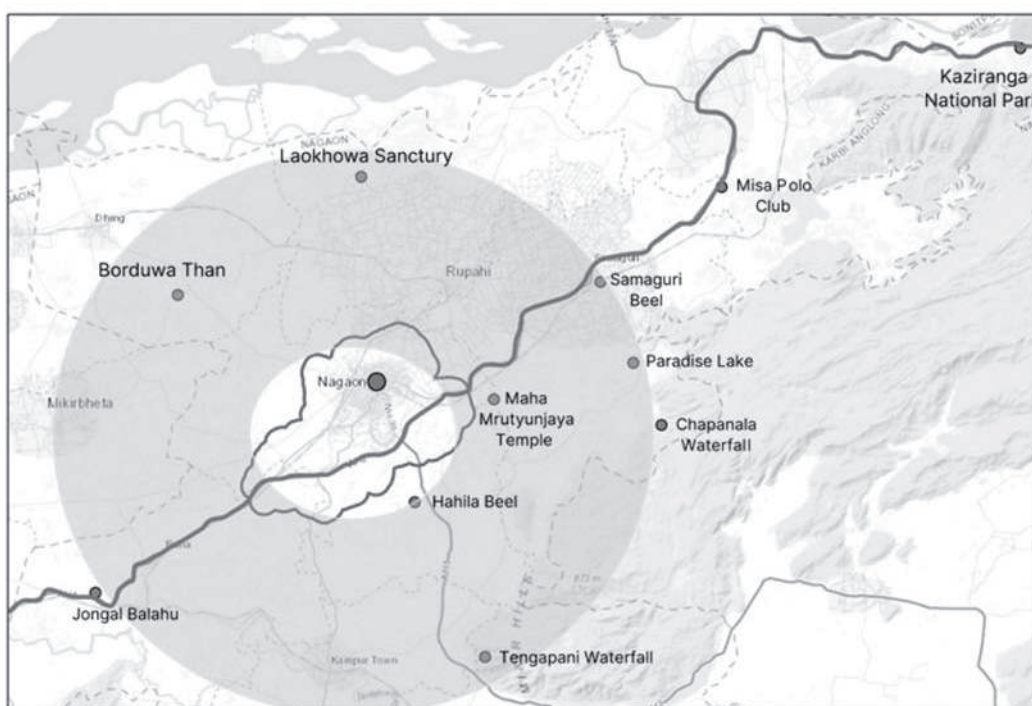


Figure 147.1 Tourism Destination in Nagaon within 25 kms

9.2.1.1 Borduwa satra

Bordowa or Bordowa Satra is a shrine, a centre of art and culture and is the birthplace of a great litterateur, artist, dramatist and founder of Vaishnav dharma in Assam. It is around 140 km away from the town of Guwahati and is 18 km north-west from Nagaon district of Assam. The Bordowa Satra is founded by great saint Sankardeva after his return from his first pilgrimage in about 1494 A.D. He found the first Namghar or Kirtanghar at Bordowa and used that place to practice and preach the newly found faith in Puran and Bhagwat. He used to call the place as Thaan or Dham and not Satra which was later called to be as such. Mahapurusha Srimanta Sankardev (1449 AD -1568 AD) was an important personality in the annals of Indian history. He was not only a religious preceptor, but also a social reformer, who had sanskritized the ethnic groups of the volatile North East India and assimilated them with the national mainstream. He is considered as the father of the modern Assamese race. He was a great messiah, who rescued the people of Brahmaputra valley from the regressive medieval practices like human sacrifice.

Srimanta Sankardev was a cultural maestro too. He created a classical dance form known both as Sankari



Borduwa Satra



Srimanta Sankardev Birthplace

dance and Satriya dance. The Sangeet Natak Academy of India recognized it as a classical dance form in 2000 AD. Srimanta Sankardev also evolved a school of classical music, which is named after him. He created as many as 25 Râgas of his own. He was also the first playwright in all modern Indian languages. Above all these, he was the first prose writer in the entire world. He introduced drop-scene and elevated stage in the world of drama way back in 1468 AD. He was also a fine artist. His art works have been preserved in the Albert Museum of London. Than means a sacred place in Assamese society. Traditionally this word has been used to indicate a sacred place. It was derived from the Sanskrit word 'Sthan' meaning place. Srimanta Sankardev used this indigenous Assamese word 'Than' to indicate the residential religious institution created by him. At that time the word 'Satra' was not used. Srimanta Sankardev himself used the word 'Than'. It was only later that the word 'Sattra' started to be used.

(source: Borduwa satra portal)

9.2.1.2 Laokhaow and burhachapori wildlife sanctuary

Laokhowa Wildlife Sanctuary covers an area of around 70.13 sq km and lies on the southern bank of the Brahmaputra River. It forms an integral part of the Laokhowa-Burachapori eco-system and is a notified buffer of the Kazairanga Tiger reserve. The sanctuary is home to the great Indian one horned Rhinoceros, elephants, royal Bengal tigers, Asiatic water buffaloes and more than 225 species of birds.

The barking deer, fishing cat, leopard cat, civet and wild pig are some of the other animals seen in the sanctuary. The sanctuary is also a breeding ground for around 39 species of fishes, 9 species of amphibians and 14 species of reptiles.

the Laokhowa and Burhachapori Wildlife Sanctuaries from time to time. In addition to that, wet alluvial grassland sustains a large number of herbivores like sambar, barking deer and hog deer along with nocturnal species like pangolins, slow loris, porcupine and hare etc. Many rare and endangered species (many of them coming under the Schedule I species category under the Wildlife Protection Act, 1972) of small cats, civets and otters, reptiles like pythons, common and water monitor, turtles like Assam Roofed, Indian Roofed, Peacock Softshelled, Soft shelled Turtles, Butterflies like Birdwing, Common Map, Crimson Rose etc.

River and wetland tourism: The Brahmaputra River flows along the north of Burachapori. The river is dotted by numerous sandy river islands. There is a houseboat available with the Burhachapori WLS which can be used by tourists to visit the sandy islands where one can entertain themselves by indulging in beach sports and other such activities. The scenic beauty of the landscape and the glorious sunsets can be enjoyed by the tourists.



Burachapori Sanctuary



Laokhaow sanctuary

9.2.1.3 Samaguri

Samaguri Satra- This small satra out on a country road 11km east of Kamalabari, was founded in 1663 and has been making traditional dance masks from bamboo, cloth, clay, cow dung and paint ever since. One will be given a short explanation of the process in a room filled with masks and large images of Krishna in his Narasingha incarnation. Some small masks are for sale as souvenirs. Also, this place is known for making masks.

Samaguri Beel - Samaguri beel lies towards the north eastern side of the Nagaon District. The Samaguri beel is located between 26° 25' N latitude and 92° 51' E longitude. Samaguri beel one of the ox-bow lake shaped wetland of Nagaon district. This wetland



is formed due to the shifting of meandering courses of river Kolong. It is situated about 20 kms away from Nagaon town. The area covered by the beel is 43.65 hectares in 2015 according to Google earth image. It is surrounded by Sonaibali and NH 37 in the north, Gatanga in the east, Samaguri Grant and Auniati satra in the south and Baziagaon in the west direction. Still Samaguri beel is connected with a small stream which is locally known as Ghatir Ghulung.

The mesmerizing view of the lake is one of the most popular things to see and when the wetland is surrounded by migratory birds then it is the best place in entire Assam. Apart from that, a nature conservation park is also there which will attract you as well.

Samaguri beel



Mirgratory birds in Samaguri beel



9.2.1.4 Rockland amusement park:

Facing the Samaguri Lake Tourism Project, the Rockland Park is in Samaguri Grant falling around 24 Kms from Nagaon, it can be reached in around 45 minutes via the AT Road and NH 37. Falling under Nagaon District, the Rockland Park serves as the: only recreational park in the city of Samaguri. Rockland Park itself is quite a package for children as well as for the adults, there are several large rides installed making it more of a small amusement park for the children. For grownups there is ample space for relaxing and enjoying the majestic view of the lake along with fountains and flowering plants and large tree growths inside the park premises.

Rockland Amusement Park

**9.2.1.5 Maha Mritunjay Mandir**

The Maha Mrityunjay Temple in Puranigudan, Nagaon is now quite renowned for the record of constructing the 126 feet tall Shiva linga which is the largest Shiva Linga in the world. The construction commenced in the year 2003 which was initiated by Acharya Bhrigu Giri Maharajas this was his place where he used to meditate. As per the mythological beliefs of the Maharaj, during the historic period, Shukracharya, the guru of the Daityas or Asuras performed religious rituals where the temple is situated.



9.2.1.6 Hahila picnic spot

The Hahila beel is one of the largest natural wetlands in Assam having great economical, ecological, biological and sociocultural importance. It has rich floral and faunal diversity. Besides, huge congregations of residential water birds are also found in the beel. The Hahila beel harbors large number of migratory birds each year. Not only for tourism but this beel has economic importance for fishing, irrigation, Root Collecting (Especially of arum) and grass cutting.



(Source-Socio-Economic Influences of Wetlands International Research Journal of Social Sciences)

9.2.1.7 Champavati Waterfall

Champawati Kunda in Chapanala, Nagaon Champawati Kunda is a famous fall situated in Chapanala in Nagaon. Chapanala waterfall is a lovely place to visit for weekends and daytime leisure creation. The waterfall and Tea Gardens around and birds and different species of breeds are lovely to watch. This place is 1 hour (approx) from Nagaon Town. Weekly marketing (Bazaar) on Sunday is a tradition market with local products are point of attraction. The inhabitants are mostly Assamese and Bengali peoples with some percentage of Christians and Adivasi villagers around the tea gardens. Road condition is quite bad for small cars but good for HUV segment cars to reach at the site. People must arrange their food along with or can cook at site for fresh food. Perfect place for refreshment in weekends.



Champavati Waterfall

9.2.1.8 Paradise Lake

The beautiful Paradise/Neelapani lake is located at Kothalguri village in Nagaon district, Assam. The village has a population of around 300 people. The lake has become a popular picnic spot and people from different places of North East India have started visiting this stunningly beautiful lake.



(Source: Nagaon district portal, Assam govt. <https://nagaon.gov.in/>)

9.2.1.9 Tengapani Kathiatoli Waterfall

Tengapani is one of the beautiful and dangerous but attractive Waterfalls in Assam located at Kathiatoli Hill Range, Assam. Tengapani is laying down in the lap of the Reng-Beng Hill in Assam and attracts tourists by its natural beauty of waterfalls and cascades of the streamlet. The name 'Tengapani' is given for its Sweet Water Spring.



9.2.2 TOURISM DESTINATIONS FROM NAGAON WITHIN 50 KM RADIUS

9.2.2.1 Misa Polo Club

The Misa Polo Club was built with the intention of creating a social and educational hub for the tea planting community. It is located in the picturesque Kellyden Tea Estate which is a 3 hour's drive from Guwahati, the capital of Assam. It is just 40 kms from Nagaon and 35 kms from Tezpur. The Misa Polo Club was established in 1888 as a social Polo Club for the planters and heads of the British District Administration. The British planters introduced the club culture and encouraged social interaction through sports and other celebratory occasions. Apart from the facilities for indoor games, tennis and

cricket, a 9 hole golf course was added later.

The Club was used by the US Army when they were temporarily stationed in Misa during World War II and gifted a plaque to the Club in appreciation for its hospitality. Ports. The outdoor sports centre has a 18 Hole Golf Course with a driving /chipping range and a putting green. There are also 3 Lawn Tennis Courts and a Badminton Court along with a Kiddy's Corner. There is a fully equipped gymnasium as well as provisions for playing indoor games like Billiards, Table Tennis, Carrom, Darts, Chess and Cards.

Outdoor game	Indoor games
<ul style="list-style-type: none"> • 18 Hole Golf Course • Driving/Chipping Range • Putting Green • Lawn Tennis • Badminton • Volleyball • Croquet • Kiddy Corner 	<ul style="list-style-type: none"> • Table Tennis • Billiards • Darts • Chess • Carrom • Cards

Management and development centres

- Drop down screen with overhead projector
- Wi Fi connectivity
- Library with E-book facility and browsing
- Fully equipped Gymnasium
- On-site cook with catering
- Fully functional Bar
- Customized stationary on order
- Visit to Tea Estate and Factory

Infrastructure Plans on the Anvil

To establish Misa Polo Club as a 'one of a kind' recreational hub in Assam, a phase-wise plan is being put in place to build duplex cottages with modern amenities adjacent to the Club.



Misa Polo Club



(Sources: Amalgamated plantation, <https://amalgamatedplantations.co.in/>)

9.2.2.2 Kaziranga National Park

One of the most sought-after wildlife holiday destinations in India, Kaziranga National park's 430 square kilometre area sprinkled with elephant-grass meadows, swampy lagoons, and dense forests is home to more than 2200 Indian one-horned Rahinocoros, approximately 2/3rd of their total world population. Formed in 1908 on the recommendation of Mary Curzon, the park is located in the edge of the Eastern Himalayan biodiversity hotspots – Golaghat and Nagaon district. In the year 1985, the park was declared as a World Heritage Site by UNESCO. After a series of meetings and documentations, the Kaziranga Proposed Reserve Forest was created with an area of 232 km² (90 sq mi) in 1905.

Along with the iconic Greater one-horned Rahinocoros, the park is the breeding ground of elephants, wild water buffalo, and swamp deer. Over the time, the tiger population has also increased in Kaziranga, and that's the reason why Kaziranga was declared as Tiger Reserve in 2006. Also, the park is recognized as an Important Bird Area by BirdLife International for the conservation of avifaunal species. Birds like lesser white-fronted goose, ferruginous duck, Baer's pochard duck and lesser adjutant, greater adjutant, black-necked stork, and Asian Openbill stork specially migrate from the Central Asia during the winter season.

The park is known for its good population of animals but more than that its the wildlife conservation initiatives that take place in the park are more popular. With its amazing wildlife conservation activities, the park has successfully managed to grow the population of Greater one-horned Rahinocoros, an endangered species.

Flora:

Due to the difference in altitude between the eastern and western areas of the park, here one can see mainly four types of vegetation' like alluvial inundated grasslands, alluvial savanna woodlands, tropical moist mixed deciduous forests, and tropical semi-evergreen forests. Kumbhi, Indian gooseberry, the cotton tree, and elephant Apple are amongst the famous trees that can be seen in the park. Also, a good variety of aquatic flora can be seen in lakes, ponds, and along the river shores.

Fauna:

The forest region of Kaziranga Park is home to world's largest population of Indian Rahinocoros. Other animals that can be seen in the elephant grass, marshland and dense tropical moist broadleaf forests of Kaziranga are Hoolock Gibbon, Tiger, Leopard, Indian Elephant, Sloth Bear, Wild water buffalo, swamp deer, etc. With increase in tiger population every year, the government authorities declared Kaziranga as a Tiger Reserve in the year 2006. Also here one can find good number of migratory bird species from Central Asia.

Safari Gate/Zones

Sprawling over an area of 430 sq km, the park alias the hotspot of diversity is split into four areas; each has its own distinguish feature regarding grasslands, the density of mammals & bird, land topography, terrains.

Major Attractions in & Around the Park

Around Kaziranga, one can find an ample number of nature getaways options like wildlife sanctuaries, parks for bird watching and hill stations.



9.2.3 TOURISM DESTINATIONS WITHIN NMPA

9.2.3.1 Religious Destinations

Shiva Mandir -This is old temple in Nagaon town, situated in the heart of the city. It is beautiful vibrant temples with open premises in main market area, i.e., Haiborgaon, Nagaon.



Hanuman Temple: This is an ancient hanuman temple, probably the ancient temple in Nagaon. It is situated in the main market of Nagaon.



Kalibari Durga Temple- This is Goddess Durga temple, established by Bangali community. The temple facades reflect the Bengali culture, and many hindu festivals majorly durga puja and Navratri celebrate here.



Ram – Krishna Satsang Samiti

This trust has a cultural background from Bengal, and many satsang festival used to celebrate here.

**Baptist Church-**

Nagaon Town Baptist Church is one of the oldest churches in Assam. It was set up by Pitt Holand More in the year 1846. It has long history and considered the oldest Church in Nagaon town.

Satsung Seva Trust

the Satsung Seva trust is charitable trust managing all hindu religious activities and festival celebrations in Nagaon town.



Jagganath Temple the jagganath temple is lord Vishnu's avtar, considered as 'lord of universe'. This is temple in main town, special fasting and festival have been celebrated since ages.

**Nagaon town Eidgah**

The Eidgah is in the center of city, with a beautiful garden premises along with prayer place. This Eidgah situated in Decapatty, the main market in Nagaon

9.2.3.2 Art and Craft Destination

Nagaon kala mandir

This place of cultural activity is situated in the Fauzdaripatty of Nagaon town. A small durga temple is also there. The place is well known for cultural knowledge of tradition and also counted as a holy place.



Pranab Barua Art Gallery

This art place is situated in the core area of Nagaon, Artist Pranab Baruah paved a new path in the contemporary art movement in Assam with a unique style of his own. Pranab Baruah, a versatile artist, born in a cultured and well-off family in 1935. His home, a paradise like abode by Kolong paar, the channel, which had been the constant source of inspiration for many creative artists and writers of this region.

3.1.3.2 Recreational Areas

Marar park

Situated on MG Road, at a distance of 1.5 Kms from the center, one can reach the Marar Park in under 10 minutes via the AT and MG Road. Marar Park is the only proper park in the city of Nagaon bringing in the essential need for place to hang out and revitalise oneself. Spread in a small area, the Marar Park is very common hangout place in the whole of the city providing a much-needed break from the monotonous life and being a haven for children. Reaching the park, one is welcomed with a gated

entry with large fonts stating the name of the park, upon entering one can find a much greener and peaceful environment all around, pathways are built for casual strolls and jogging. Marar Park recently went under renovations which resulted in a number of new additions to it, one such is a game zone much loved by the children for all the games provided to them. One can find numerous statues of birds and animals all around the park, statue of flamingos and other birds can be found, the largest

being that of a dinosaur. Benches and small wooden trunk cut are installed for people to sit and relax with children playing around in the park. The garden inside the park also features a number of flowers which adds to the beauty of it. In the center is a small fountain installed with running water show, visitors can also find a cabin like refreshment center inside the premises. A number of rides including see-saws, swings, slides and others complete the park.

Marar park



9.3 HOTELS AND RESTAURANTS

Table 189: Hotels and Resorts in Nagaon

Sr. No.	Hotels		Resorts
1	Hotel Blue Bird Annexe Hotel Nagaon Point Hotel Piyush Regency Hotel Bohagi Hotel Abhinandan International Hotel Swagat Prashanti Tourist Lodge Hotel Am palace	3 Star	Okinawa Resort and Botanical Park (Uriagaon, Old Nonoi Road, Nagaon)21 <ul style="list-style-type: none"> • Situated at 6 km from the town. • Spread over a sprawling area of 20 bigha.
2	Hotel Natraj Hotel Bidisha Hotel Relax Hotel Star Hotel Perth Hotel Rajasthan	2 Star	Jasingfaa Aqua Tourism Resort (Marikolong, Nagaon) It is a fish-based Aqua Tourism project and is 5.5 km away from the town. Covers land area of 15 acres out of which 8 acres are covered by water consisting of small tanks.

Table 190: Restaurants in Nagaon

Sr. No.	Name of Restaurant	Type of outlet	Veg/Non-veg
1	Regal Palace Restaurant	Family-friendly, Indian cuisine restaurant	Both
2	Hotel Aashirwad		
3	Restaurant Kuhelika		
4	Restaurant Kolong		
5	Tulips Restaurant		
6	Mint Leaf Restaurant		
7	Nightingale Restaurant		
8	China Town Restaurant	Chinese cuisine restaurant	
9	Red Chilly	Fast Food	
10	My Shyam Restaurant		
11	Domino's Pizza		
12	IFC		
13	Chalachal Restaurant	Middle eastern cuisine restaurant	
14	Na Khuwa Restaurant	Ethnic restaurant	
15	Rupak Assam	Nasi goreng restaurant	Non-veg
16	Lebanese Shawarma	Lebanese cuisine reataurant	
17	Meat and Eat	Indian cuisine restaurant	
18	Tandoor Cave		
19	Blue Ginger Cafe	Cafe	Veg
20	Barabazar Diary	Family-friendly, Indian cuisine restaurant	

(Source: Domestic Tourism, Assam, Ministry of Tourism)

As per Survey in Tourism statistics in Assam, total number of visitors in Nagaon is 20,000 (approx.), out of which 20 are foreign visitors (not to count Kaziranga). It is one of the lowest when compared with other cities of the state though it has got a lot of tourist spots. The problems are listed below:

Table 191: Tourism problems with solution

Problems	Solutions
Lack of Awareness - A large percentage of tourists found the tourist attractions not interesting.	To develop a proper website, that enables to give enough information to domestic and foreign tourists.
Lack of Skilled Manpower - 81% of the visitors found shopping facilities inadequate.	To involve tribal youth to showcase the art, culture, heritage and livelihood.
Problems	Solutions
Lack of Service Infrastructure - No youth hostels, tourist bungalows. - Accommodation facilities are assessed as poor by those who visited. - Just 1.6 is the average duration of the stay (around 80% of the tourists come for a day trip only). - 57% assessed entertainment facility as poor.	To develop sufficient accommodation in all tourist spots and should be well-maintained too.
Lack of Connectivity - Transport facilities are assessed as poor by those who visited.	To develop the road network and public transportation should be accessible to all the spots and cabs facility should also be provided.

9.4 STRATEGIES FOR DEVELOPMENT OF RECREATIONAL AREAS

Recreation is any physical or psychological revitalization through the voluntary pursuit of leisure time. It is an activity which is relaxing to people and provides diversions from their normal routine. Generally there are four types of recreation activities:

- **Revitalization:** restoration and enhancement of mental and physical health.
- **Play:** relaxation and exercise
- **Adventure:** excitement and challenge
- **Education:** organized and incidental
- City level recreational facilities are of two types:
 - **Indoor** facilities consist of libraries, clubs, cinema hall, auditorium, multiplex, art and craft centre, shopping malls, food courts, cyber cafés, gymnasium etc.
 - **Outdoor** recreation facilities consist of gardens, parks, play grounds, golf courses, zoo, botanical garden, race course, stadium, exhibition ground, water sports complex, green ways, bike ways etc.

9.4.1 PROPOSALS FOR AUGMENTATION AND DEVELOPMENT OF RECREATIONAL FACILITIES

- Development of green belts, plantations, parks, Ghats, plazas along the Salandi riverfront abreast the Urban set up and invite nature in harsh built environment through myriad ways.
- Amusement Parks to be developed along with horticulture, Pisi-culture, herbal parks, etc.
- Development of eco-tourism with provision of water theme parks, lagoon resorts, weekend resorts and world class recreation centres such as club towns, golf clubs, spa resorts, etc. at Planning Area level

9.5 PROPOSED STRATEGIES TO BOOST TOURISM

As a service industry, tourism has numerous tangible and intangible elements. Major tangible elements include transportation, accommodation, and other components of a hospitality industry. Major intangible elements relate to the purpose or motivation for becoming a tourist, such as rest, relaxation, the opportunity to meet new people and experience other cultures, or simply to do something different or have an adventure. Tourism is vital for every place, due to the income generated by the consumption of goods and services by tourists, the taxes levied on businesses in the tourism industry, and the opportunity for employment and economic advancement by working in the industry. For these reasons government and private agencies sometimes promote a specific region as a tourist destination, and support the development of a tourism industry in that area. The contemporary phenomenon of mass tourism may sometimes result in overdevelopment; however alternative forms of tourism such as ecotourism seek to avoid such outcomes by pursuing tourism in a sustainable way.

Nagaon Region offer great potential for tourism development. According to the existing scenario analysis, it has been observed that the following categories of tourism have immense potentialities for this region:

- Religious Tourism with historically important structures such as temples and other outdoor worshipping areas in the vicinity
- Cultural and Heritage Tourism with annual / seasonal traditional village fairs and festivals, folk or tribal socio-cultural events with arts, crafts, music, dance etc.
- Nature based outdoor recreation and Eco-tourism for hills, forest, riverfront, wildlife sanctuary and vast agricultural area/ village settlements with undulating landforms including picnic spots, sightseeing, camping sites etc. Presence of all these tourism products calls for the growth of Adventure Tourism.

10 ENVIRONMENT

10.1 INTRODUCTION

Environment plays an important role in the sustainability of a region. The balance between different environmental aspects and development defines the progress and livability of an area. The most crucial factors which affects the livability of an area are primarily, land and water. With an increase in the demand of the water, the demand for urban land is also increasing. People flock to urban areas to seek employment, entertainment, shopping and generally a higher standard of living. At the same time, environmental infrastructure for works and services are inadequate to serve the resulting increase in population and population densities.

The inevitable congestion causes environmental hazards and degradation until strategies for reversing environmental deterioration can be implemented. Hence, the magnitude of urban population growth in developing countries is a direct indicator of the degree of spatial concentration of people, industries, commerce, vehicles, energy consumption, water use, waste generation and other environmental stresses. Several environmental aspects are considered and studied to access the environmental conditions of the planning area. This analysis is presented in this chapter along with proposed strategies to safeguard the environment of the planning area.

10.2 GEOGRAPHY OF THE REGION

Geography of Nagaon District is appositely characterized by various highlands, rivers, and marshy lands. Geo-morphologically, Morigaon District and Nagaon District together form the shape of a broken dish. Nagaon District is bounded by Sonitpur District and Brahmaputra River on the north, by West Karbi Anglong District and North Cachar Hills on its south, by East Karbi Anglong District and Golaghat District on its east. Geographically, Nagaon District is one of the largest districts of Assam. Its highlands include Hatimura Parbat with an altitude of 186.5 metres, Barkandali with an elevation of 853 metres and Kamakhya Parbat with a height of 244 metres.

Geography of Nagaon District comprises some major rivers like Brahmaputra River, Kalong, Sonai, Nanoi, Yamuna River, Kopili and the Barpani. The major river is the Kalong which divides the town into two halves - Haibargaon and Nagaon. Moreover, there are several beels, marshy lands and swamps; these are actually the old abandoned channels of Kalong and Kopili rivers. These are Marikalong, Potakalong, Haribhanga, Jongalbalahu, Samoguri beel. These beels are the unused resources of the district. There are about two hundred numerous marshy lands here. Northern and the southern regions are uplands. General slope of Nagaon District is towards the west. The eastern, north eastern and the south eastern parts are hilly terrains. Geologically, the soil of Nagaon District is of sandy texture.



Figure 148 Brahmaputra riverbank near Silghat, Nagaon

Geography of Nagaon District is also determined by the pleasant weather of the region. In fact, it enhances the picturesque topography of this district of Assam. The climate is in general monsoon type. However, there are some differences from the other districts of Assam. The climate is of an extreme type compared to other districts of Assam. The pattern of rainfall is such that the south is usually dry and the north is relatively rainier. Rainfall from south to north increases. The average rainfall is near about 1750 mm. Deforestation, speedy

urbanization and global warming, etc. are changing the rainfall pattern of the district. Nagaon District has a vegetation cover of around 12 percent. Thus, it is noticeable that geography of Nagaon District is spread over vast plain lands dotted with fewer hilly terrains. The wonderful climate enhances the topographical features of the region.

10.3 THE KOLONG RIVER

10.3.1 EXISTING CONDITION

Urbanization has got its own advantages and disadvantages. The main advantage is that it provides scope for provision of common infrastructure facilities. The main disadvantage is that it creates more strain on the resources (including land and water). The environmental consequences of urban growth are considerable. Cities are prolific users of natural resources and generators of wastes. The urban ways of living contribute to relatively more pressure on resources. Migration of people to cities puts enormous pressure on the infrastructure in terms of available land, water etc. Some of the issues will be water scarcity and water pollution, air pollution, climate and Heat Island Effect, poor management of solid wastes, urban congestion etc. in the system. Economic activities also constitute an indirect pressure in the sense they increase the movement of men and material. This leads to increased fuel consumption, waste generation etc.



Figure 149 Kolong River, Nagaon

The Kolong River of Nagaon district, Assam has been facing serious degradation leading to its current moribund condition due to a drastic human intervention in the form of an embankment put across it near its take-off point from the Brahmaputra River in the year 1964. The blockage of the river flow was adopted as a flood control measure to protect its riparian areas, especially the Nagaon town, from flood hazard. The river, once a blooming tributary of the mighty Brahmaputra, had high navigability and rich riparian biodiversity with a well established agriculturally productive watershed. However, the present status of Kolong River is highly wretched as a consequence of the post-dam effects thus leaving it as stagnant pools of polluted water with negligible socio-economic and ecological value. The Central Pollution Control Board, in one of its report has placed the Kolong River among 275 most polluted rivers of India. The river Kolong is fed with several rivulets namely Diyu, Misha, Diphalu, Haria-Nanoi and Titaimari or Rahasuti. Receiving the water from aforesaid rivulets, the river Kolong become bigger and enters the district of Morigaon passing through

the National High Way-37 at Bhatigaon and Mulankota Manipurtup area under Raha circle. In the district of Morigaon, another important river Kapili joins Kolong course at Dukhutimukh of Jagibhakatgaon area.

10.3.1.1 Polluted River Stretch

The length of the polluted stretch of Kolong river at downstream ADP bridge is 7.5km (approx.) with an area of 21.4 sq.km. (Fig 150) and the stretch identified as polluted is from Diphalu to Kutayani.

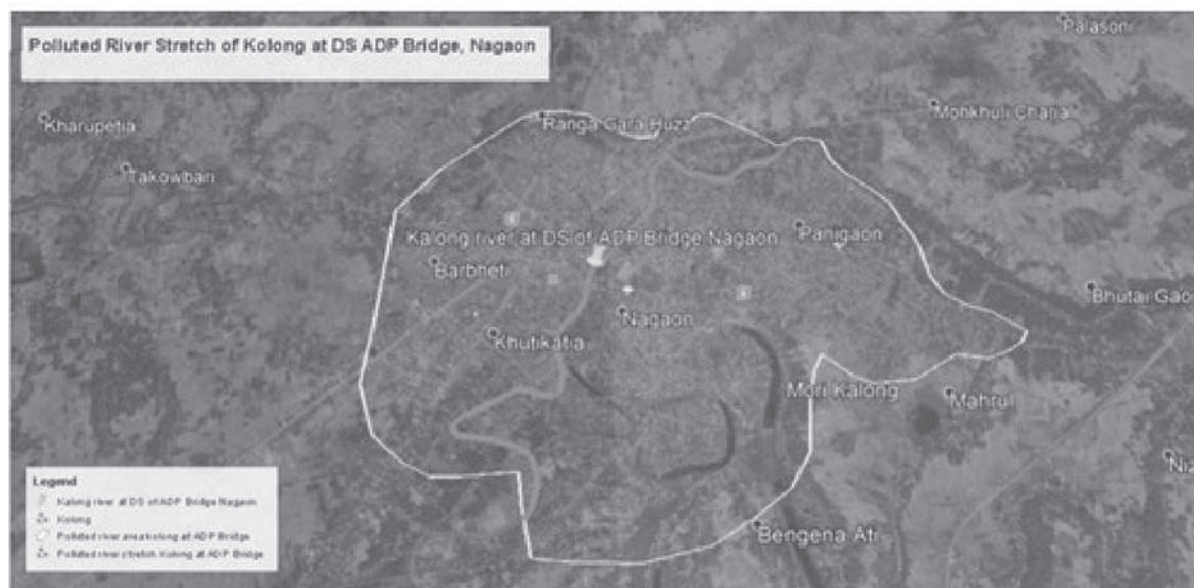


Figure 150 Map showing the polluted river stretch of Kolong river at d/s ADP bridge

The length of the polluted stretch of Kolong river at Morigaon is about 1.5 km with an area of 2.0 sq.km. (Fig 151) and the identified polluted stretch is from Bangthaigaon road to Baghjaip.



Figure 151 Map showing the polluted river stretch of Kolong river at Morigaon

10.3.1.2 Identification of Locality around riverbank

Nagaon is the major town located on the bank of the Kolong river. The approximate population of the Nagaon town is 1,48,496 as per Census 2011. The major localities identified in and around the catchment areas of polluted stretch of Kolong river at down streams of ADP bridge are Diphalu, Ratnapur, Anandanagar, Panigaon, Jyotinagar, Kachali (No.2), Dimoruguri, ChotoHoibor, Kachalukhuwa, Morikolong, Barbheti, Khutikatia, Sensuwa etc.

Kolong river also enters Morigaon district at Manimurtup, however, the polluted stretch of the river is not identified across the major populated locality of the district i.e Morigaon town. Bhakatgaon is the only major village located in the bank of the polluted river stretch of Kolong river at Morigaon area. The area is a medium sized locality with a population of around 1780 with 378 households as per Census 2011.

10.3.1.3 Quantity of Sewage generated

The major town/village responsible for contribution of sewage in the polluted stretches of Kolong river is Nagaon. The waste generated by Nagaon town is approximately 16037.6 KLD. (Source: Action plan for Kolong river, PCB, Assam)

10.3.1.4 Sewerage Treatment Proposal

As per the survey done, one (01) number of STP has been proposed at Nagaon town in consultation with the District Administration.

Table 192 Sewerage Generation Calculation

Sr. no.	Area	Population	Water consumption (KLD)	Sewage generation (KLD)	No. of STPs proposed	Existing Treatment capacity (KLD)	Gaps in KLD
1	Nagaon	1,48,496	20046.9	16037.6	01	Nil	16037.6

(Source: Action plan for Kolong river, PCB, Assam)

10.3.1.5 Drains contributing to pollution

Three major drains are identified in the Nagaon town, which is responsible for draining off majority of the municipal, industrial and commercial waste from the town to the river. The details of the drains or outfalls that carries majority of the city sewage in Nagaon town is presented in Table 193.

Table 193 Natural Drains merging Kolong

Sr. no.	Location
Drain 1	Near ASTC bus stand, Nagaon
Drain 2	Near Anandaram Dhekial Phukan bridge, Nagaon
Drain 3	Near Law College, Nagaon

Most of the households have individual drainage that has been connected to soak pit, kitchen garden and stagnated pool to take care of the waste.

The drains mainly carry industrial as well as residential wastes. Direct dumping of residential and commercial garbage into the channel is making it shallower and heavily silted. As a result, during rainy season water overflows and inundates the areas. It is also observed that the drains of the town are also becoming a regular garbage-dumping site. Moreover, these drains are not planned properly to carry even the regular water.

There is no well-connected drainage system in Nagaon town, resulting in occasional flooding particularly in the monsoon season. Drains along the side of roads exist in some areas but may be blocked or not linked up properly. Flooding is of particular concern in the following areas:

- Part of Panigaon
- Hotelbar area
- Teliapatti
- Santipur
- Lakshminagar

- Islampatty
- Area opposite to the Haibargaon railway station.

In recent times, improvement schemes for the drains have been proposed by the state government with possible assistance from the Government of India. A roadside drainage improvement project has been sanctioned by the NMB but has not yet started.

10.3.1.6 Wastewater flow carried by drains

At present the Nagaon town does not have an integrated sewerage system. The only collection and treatment process being followed is the use of septic tanks. Therefore, part of the wastewater generated in the town is being disposed off into the rivers without any treatment.

The wastewater volume discharged into the Kolong River is based on the following assumptions:

- Estimated number of inhabitants contributing to wastewater discharging into the river. The estimation is carried out as follows. On the basis of the town's topography a delineation of the town is made. Based on this delineation the areal percentage of each ward contributing to the discharge is determined. The number of people living in each ward is known. And hence the number of people in each ward contributing to the discharge in the Kolong River can be found simply by multiplying the percentage and the number of people in the ward.
- Daily contribution of 108 lcpd, calculated as follows: 0.8×135 lcpd.

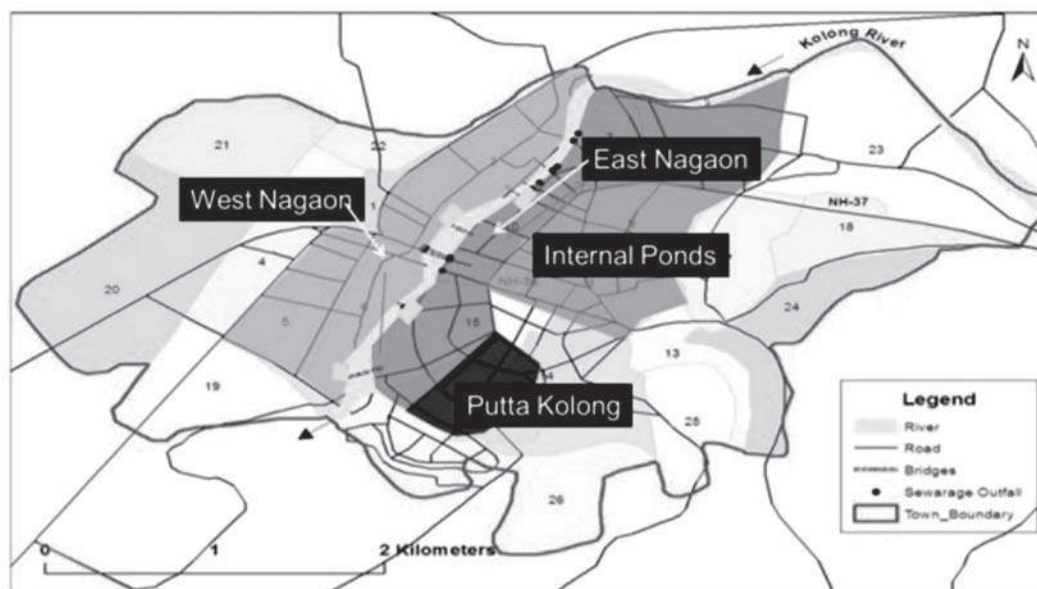


Figure 152 Wastewater Flow Carried by Drains

10.3.1.7 Wastewater Characteristics of Different Drains

The sources that have been identified include the following:

- Domestic sewage: Raw domestic sewage and partially treated sewerage in the form of septic tank effluent drains are directly connected to the storm water drainage system. The direct sewage discharges contribute heavy organic loads which affect water quality and include bacteria, viruses, and other pollutants which are harmful to human and ecological health. Similarly, the septic tank effluent contributes organic loads but at a much lower magnitude.
- Municipal solid waste (MSW): MSW (i.e., garbage) is routinely dumped in town streets and along the banks of the Kolong River. At numerous locations along the riverbank, MSW is strewn about in thin, non-contiguous layers, but in many locations, thicker, contiguous fills exist on the river banks and lie in contact with the flowing water. In many cases, metal, wood, and food wastes appear to be scavenged by local populations, dogs, and other animals, and the resulting mixture is dominated by plastic wastes. As these wastes slowly degrade, they release toxic pollution to the water.
- Storm water: Storm water is directly discharged to the Kolong River via the surface drainage system, and also as overland surface runoff. In both cases, this storm water carries solids and pollution from the town streets into the river. In addition to domestic sewage, this runoff likely includes particulates from combustion of diesel fuel and other petroleum fuels, pollution from MSW, oils and greases from pavement areas, abraded asphalt particulate, animal wastes, agricultural, and other pollution sources.
- Industrial pollution: Industrial pollution sources may include automotive maintenance areas, fuelling stations, and other industries indigenous to the area. These pollution sources can be directly discharged to the drainage system, can flow overland, or can infiltrate groundwater which ultimately discharges to the Kolong River.
- Atmospheric deposition: The air quality in Nagaon town is affected by sources such as the combustion of petrochemicals for transportation, energy, and industrial purpose and regional air quality pollution. Particulates which contain toxic combustion by-products and heavy metals such as mercury settle and dissolve into the town's waterways.

10.3.1.8 Sewage generation from the towns located on the banks of the river

The main contributor of pollution in the river is municipal sewage. There are no treatment systems for the sewages which are dumped in open thereby ultimately finding their ways to water bodies without treatment. Moreover, Sewage treatment facility has not been set up yet in Assam.

10.3.2 SOLID WASTE DUMPING

It is a process of storage, collection and disposal of the waste generated from various sources like households, commercial, markets, etc. Improper disposal of Municipal Solid Waste (MSW) has a negative impact in terms of contamination of soil, surface water, ground water and generation of toxic and green-house gases. However, use of adequate information, resources, and efficient management practices could turn some of the solid waste into a useful resource.

According to the Municipal Solid Waste (Management and Handling) Rules, 2000, municipalities are responsible for municipal solid waste management and in Nagaon town; the NMB is doing the municipal solid waste management. The total waste generated per day in Nagaon town is approximately 30-32 metric tonnes (MT) from various sources like households, commercial establishments, hotels, marketplaces, drain cleaning and street sweeping, construction waste etc. Out of the total generated waste about 22-23 MT are collected on the daily basis, which is about 70% only. As per the information provided by NMB staff, there are around 90-100 bins placed all over the town. The material of these bins is either fibre or cast iron. The condition of these bins is bad as can be seen from Figure 153.

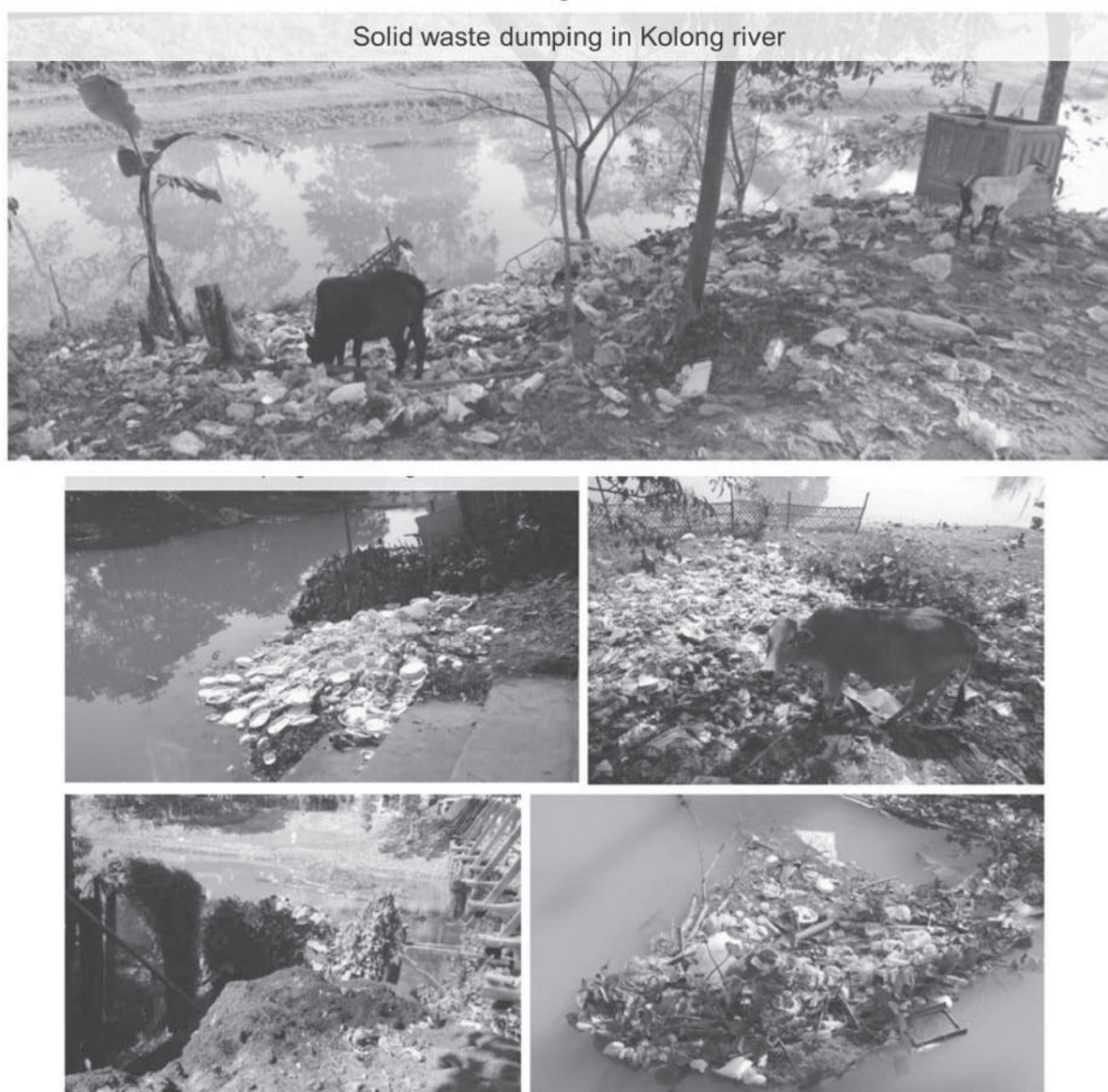


Figure 153 Solid waste dumping along Kolong River

As stated above, the estimated waste generated across the town is 32 MT, which implies that the total waste generated per capita is approximately 0.2 kg/capita/day, considering an average family size of 5 persons. Official data on the category wise solid waste generated are not available. However, the general composition of the solid waste is as shown in table below.

Table 194 Solid Waste Composition

Sr. no.	Composition of waste	Percentage (%)
1	Food and garden waste	40
2	Glass and ceramics	5
3	Paper	27
4	Metal	15
5	Inert	4
6	Plastic rubber	6
7	Textile	3
Total		100

(Source: Pollution Control Board, Assam Conservation of River Kolong, Nagaon)

10.3.3 GROUND WATER

The quality of ground water in the Nagaon district is suitable for both the drinking and irrigation purposes except the high concentration of fluoride (F) with concentration varying between 0.5 to 8 ppm and iron with a concentration varying from 0.14 to 1.29 mg/l in certain areas.

The quality of ground water in the near by district is suitable for both the drinking and irrigation purposes except with higher concentration of iron (Fe) in the range of 0.1 to 2.5 ppm is observed in few pockets in shallow and deep aquifers of the district. However, the high concentration of iron beyond permissible limit in ground water in some of the areas of Nagaon and Morigaon districts can pose problem, which can be lowered by aeration and filtration method.



10.3.4 WASTE MANAGEMENT PLAN

Table 195 Waste Management Plan

Sr. no.	Type	Status	Proposed actions	Authority
1	Industrial Waste	<ul style="list-style-type: none"> No industrial waste dumped on land or discharged into water bodies/river. Industrial wastes are managed by industries itself Authorisation have been granted to different industries in line with Water act 1974, Hazardous Waste (Management, Handling and Transboundary Movement) Rule, 2008 as amended. Regular monitoring by PCBA to ensure that the terms and conditions are strictly adhered in accordance with the prescribed standard 	Direction issued to the industries to identify the non-point sources and arrest contamination of storm water.	Pollution Control Board Assam
2	Municipal waste	<ul style="list-style-type: none"> Dumping is carried out unscientifically in the open space. No proper segregation of bio-degradable and nonbiodegradable waste No proper segregation of dry and wet waste Lack of unscientific disposal facilities/ infrastructure technology like decentralized composting or bio-methanation plant, waste to energy plant, solid waste management plant. 	Municipal Body is in process of inducing the following activity <ul style="list-style-type: none"> Implementation of segregation of waste at source Door-to-door garbage Collection of waste Formation of Sanitation task Force Formation of Neighbourhood Community Awareness campaigns Processing and disposal of waste 	Municipal Body
3	Plastic Waste	<ul style="list-style-type: none"> Dumping is carried out unscientifically in the open space along with the municipal waste. No proper segregation of bio-degradable and nonbiodegradable waste No proper segregation of dry and wet waste Lack of unscientific disposal facilities/ infrastructure technology like decentralized composting or bio-methanation plant, waste to energy plant, solid waste management plant. 		Municipal Body/ Pollution Control Board Assam
4	Hazardous Waste	<ul style="list-style-type: none"> Hazardous waste are managed by hazardous waste generating industries itself by disposing the same through authorised recycler, secured landfill area, Bioremediation etc. PCBA has engaged collection centre for collection of Hazardous waste Lack of TSDF facility for commonly utilization by hazardous waste generating industries 		Pollution Control Board Assam
5	Biomedical Waste	<ul style="list-style-type: none"> Segregation at the source under Biomedical waste Management Rules, 1998 as amended The HCFs have installed ETP for treatment of liquid waste generated 		HCF units/ Pollution Control Board Assam
6	E -waste	<ul style="list-style-type: none"> Most of the e-waste generator have sent their e-waste to their respective manufacturer. Annual return in (Form-3) is submitted by E-Waste generating units to PCBA from time to time for onwards transmission to CPCB There is no authorised recycler, refurbisher, dismantler etc. available to ensure environmentally sound management of Ewaste. There is no "facility" wherein the process of dismantling, recycling, and disposal of ewaste are carried out. Most of the e-waste generator sent their e-waste to their respective manufacturers 		Pollution Control Board Assam

(Source: Pollution Control Board, Assam Conservation of River Kolong, Nagaon)

10.3.5 PROPOSED STRATEGIES FOR RIVER

10.3.5.1 Key elements to encounter

- Urbanisation around the river
- Polluted drains contributing to the river
- Sewerage outlet in the river
- Solid waste dumping around river

The restoration and conservation of the Kolong River is an important goal for the Nagaon town. To achieve this goal, in a sustainable manner, several actions are necessary. These actions focus on addressing pollution from the major sources – raw domestic sewage and MSW – and improving the hydraulic conditions. Actions are also proposed to provide human use benefits for the citizens of Nagaon. By providing these benefits, and connecting people to an improved waterway, the stewardship of the river can be shared by all and achieve lasting conservation success

10.3.5.2 Proposed Actions that Comprise the Restoration Solution

To remain consistent with the framework, the proposed actions which comprise the restoration of the Kolong River include:

- Sewage collection and treatment.
- Solid waste collection and management.
- Disposal location for animal carcasses.
- Removal of legacy pollution.
- Hydraulic improvement (including uptake of water from the Brahmaputra River to revive proper flow of Kolong River).
- Improving hygiene and sanitation conditions.
- Community access and benefits.
- Setting of monitoring system.

Each of these actions is described in more detail further:

• **Sewerage collection and treatment:** Presently there is no centralised sewerage collection and treatment facility in Nagaon largely because most households have either a septic tank or soak pit. A new sewage collection system is proposed to collect all sewage and transport it to a centralised place for treatment. The system, if properly implemented, will significantly reduce pollution loads to the river. Another option which may be considered is to have multiple decentralized STPs located at strategic locations throughout the catchment area. This option will be evaluated in the Feasibility Report.

• **Solid waste collection and management:** As the Nagaon town does not have any existing solid waste collection and management plan, it is proposed to have an Integrated Solid Waste Management Plan for the catchment area, which will also cover the entire town. As the town will implement a MSW collection and management system, waste will be collected from

primary and secondary locations, and transported off-site to a disposal or reclamation facility. This system will require many years to become effective as the population learns to use and value the system over current litter and dumping practices.

• **Disposal location for animal carcasses:** Nagaon has a disposal site 8 km away from the Nagaon town which is presently used for the disposal of animal carcasses. During the primary survey, signs of disposal of carcasses in the Kolong River were not observed but are known to take place.

• **Removal of legacy pollution:** Due to current practices, there is significant pollution in the Kolong River from sewage and MSW sources. Although this pollution could be allowed to naturally attenuate following sewage and MSW source control measures described above, the restoration of the river can be significantly accelerated by removing this legacy pollution. This action would involve dredging and bank clean-up to remove this legacy pollution.

• **Hydraulic improvements:** Regular flooding of the Nagaon town due to Kolong River in the past has resulted in closer connectivity of the Kolong River with the Brahmaputra River by the water resources department. This has resulted in less flow in the Kolong River, although the river is also connected to the Misa River and Diyu River. The pollution in these rivers also contributes to the pollution of the upstream stretch of the Kolong River. A morphological study for the off take at Brahmaputra River should be studied to find solutions for hydraulic improvement of Kolong River.

• **Improving hygiene and sanitation conditions:** A number of community toilet complexes are required

in gardens and playground areas along the river. Solid waste collection bins and proper washing and bathing facilities are required at ghats along the river.

• **Community access and benefits:** One of the keys to river conservation success is to provide human connections to the waterway. When these connections are established, everyone becomes a steward of the river and the restoration will be more likely to succeed. Examples of community benefits include the establishment of greenways along the

waterfront and points of interest to educate the community on conservation features and ecological resources.

• **Setting of monitoring systems:** An on-line system can be designed and proposed to be implemented to monitor the water flow as well as water quality of the Kolong River system. The on-line information will be used by decision makers to avoid flooding in the town.

10.3.5.3 Treatment and Disposal of Septage

Some of the households in the towns are equipped with ordinary septic tanks. Under the Swachh Bharat Abhiyan, Public Health Engineering has constructed 5893 numbers of IHHL (Individual Household Latrine) in the Nagaon district to attain open defecation free status. Moreover, public toilets have also been constructed at the commercial areas.

Following remedial actions will be taken in consideration of treatment and disposal of sewage

- Sewage Treatment plant should be installed for treatment
- The discharge should be trapped by strainers before draining off to the river.
- Every individual households should be connected to sewer lines.

- Every households should be recommended to have individual drainage that should be connected to soak pits or stagnated pool.
- Roadside hotels/restaurants should not be allowed to dispose untreated sewage and solid waste into the nearby drains or rivers. These establishments should be properly regulated by the concerned authority.
- Public awareness to control open defecation and understand the sanitary hygiene.
- Local administration should provide proper pucca toilets for the individuals or atleast community toilets through the IHHL scheme under Swachh Bharat Mission.

10.4 MORIKOLONG WATERBODY

10.4.1 CURRENT SCENARIO

Morikolong enjoys hot-wet summer and cool-dry winter. The temperature of these area drops to minimum of 80 C and raises up to maximum of 34.30 C. The average annual rainfall is about 1514.44 mm. June, July, August and September are the wettest months. On the other hand, December and January record the minimum rainfall. During dry season depth of the water of Morikolong remains at 2 meters but it raises up to 4 meters during monsoon. Various landuse patterns has been seen in the catchment area of Morikolong which include – agriculture, commercial area, residential area, and some area covers by bamboo and other trees. The ever-growing landuse changes have caused the shrinkage of waterbody area.

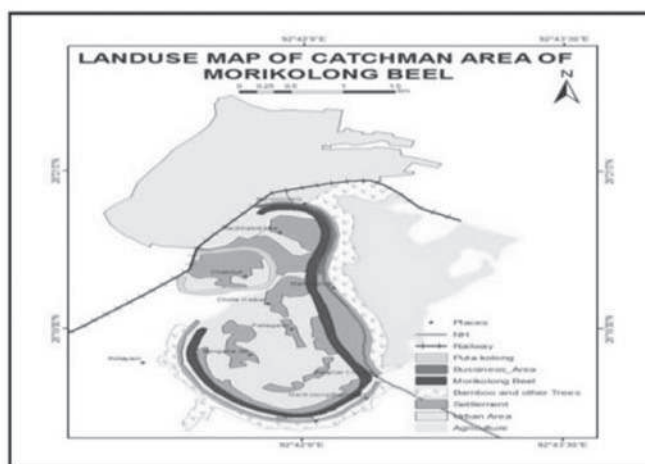


Figure 154 Mori-Kolong Catchment Landuse Map



10.4.2 BIODIVERSITY OF MORIKOLONG

Various types of flora and fauna are found in Morikolong.

Flora: Morikolong is rich in floral diversity. Some of the flora found in Morikolong is given in following table.

Table 196 Variety of Flora found along Morikolong

Sr. no.	Local name	Plant name
1	Bih Meteka	Eichornia crassipes
2	Dal Ghah	Nymeneche assamicanith
3	Boss	Acorus Calamus Linn
4	Kuhila	Aeschynomene aspera Linn
5	Jora	Alpinia galanya
6	Kola Kochu	Alocasia fornicate schott
7	Mati Kanduri	Alternanthera sessile
8	Guri Puni	Azolla Pinnata
9	Kona Simalu	Commelina benghalensis Linn
10	Keheraj	Eclipta Prostrata
11	Kalmou	Jpomoea aquatic Forsk
12	Sorupuni	Lemna Perpusilla Jorney
13	Pani Meteka	Monocharia vaginalis
14	Pani Likosi	Najas indica(will) eham
15	Bhet	Nymphaea Stellata Willd
16	Bihlongoni	Polygonaceae
17	Leheti	Renunculus sceleratus Linn

Fauna: Morikolong rich in faunal diversity include various types of aquatic birds and fishes. But due to several anthropogenic activities create threat to reduce these diversities.

Birds: The dominant aquatic birds found in Morikolong

Table 197 Aquatic birds found along Morikolong

Local name	English name	Scientific name
Sarali Hah	Whistling Duck	Dendrosygna javanica
Samukvanga	Openbill stork	Anastomus
Bogoli	Cattle egret	Bubulcus
Dolghora	Grayheaded lapwing	Vanellus cinereous
Pani kauri	Little Cormorant	Phalacrocorax
Masruka	Kingfisher	Alcedo atthis
Dawk	White breasted waterhen	Amaurosis phoenicurus
Dolmoura	Red wailed lapwing	Venellus indicus

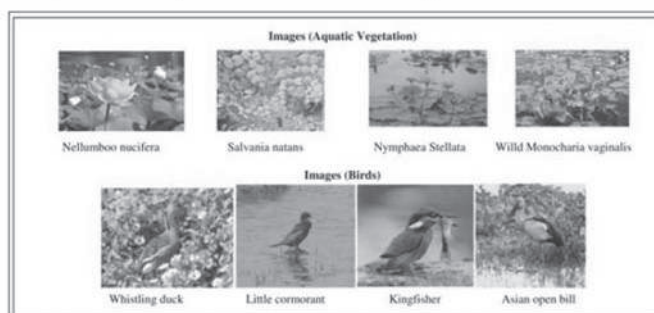


Figure 155 Aquatic Birds and Vegetation found along Morikolong

Table 198 Local names of Aquatic Birds found along Morikolong

Local name	Scientific name
Puthi	Puntius Chola
Moa	Amblypharyngodon mola
Darikona	Brachydanio rerio
Kandhuli	Notopterus
Singi	Heteropneustes
Magur	Clarius batrachus
Kawoi	Anabas testudineus
Sal	c.marulius
Soul	C.stariatus
cuchia	Monopterusuchia
Kholihona	Colisa fasciatus
Goroi	Channa punactatus
Turi	Macrognathus aculeatus
Patimutura	Glosogobius giuris

The Morikolong is an ideal freshwater ecosystem containing both organic and inorganic materials. Although it is a part of the Kolong river in far past but now it is an ox bow lake having no connection with the mainstream of Kolong river. The waterbody is perennial. In recent times the land use changes in surrounding areas due to manmade factors have left huge impact on the Morikolong. These land use changes and human impacts are discussed below:

Land use of an area is nothing but a representation of different physical as well as cultural elements which play an important role in the socio-economic development of a particular geographical area. Various anthropogenic activities have resulted into changes in land use and landcover pattern. The land use pattern effects the Morikolong in a various way. At present major portion of the Morikolong is under human settlement. On an average 68% of the area in the surrounding region of the Morikolong is used for residential purposes. Except it, the existing land cover is used for agriculture, plantation, and fallow land. Approximately 15% area is used for agriculture while 3% under vegetation cover and another 2% is used for fallow land. The fringe area of the Morikolong is used for paddy, jute, sugarcane, mustard and another crop production. As soon as the flood water recedes the fertile banks becomes ready for the cultivation of paddy, jute and other crops. Boro, a coarse variety of rice is normally cultivated in the areas during the winter season.

A few decades ago, most of the land is used for cultivation. The proportion of the fallow land is also very high. But due to the increasing population at an alarming rate most of the fallow and cultivated land is converted to the residential areas. From the field study, it is revealed that most of the people are migrated from outside of Nagaon district and settled here except the local Assamese people. Thus, density of the population is increasing day by day. So, most of the vegetation cover is being destroyed for the use of the residential purposes and thereby remaining only a small tract of the vegetation cover in present days. Along with the residential areas the commercial areas are also developed and now a vast portion of the land of the waterbody is used for commercial purposes. The market centres are growing day by day. Besides, some portion of the waterbody is also used for constructing various institutes like school, temple, mosque, library, club etc. Agricultural land, open spaces and the green belt is now converted to either residential or commercial purposes. Even the low-lying areas along with the banks is also being used for various construction. Bus stand, schools, junior colleges, commercial farms also cover a considerable portion of the wet land. Open spaces are mostly used by the families for vegetation production. A major portion of the waterbodies is now converting into the dumping place of the urban and domestic garbage"s. As the urbanization process of the Nagaon town is extended to the sub urban or peripheral regions the commercial activities also increase and

this altogether change the land use pattern.

The Morikolong waterbodies and its surrounding areas have experienced some problematic phenomena during recent years. These arises due to the rapid land use changes caused by the human activities. These changes have resulted some impact on the waterbodies such as:

Degradation of the water quality: The rapid increase of the residential areas leads to increase in the waste products which are often directly dumped into the waterbodies So, a large portion of the waterbody is deposited with waste products and garbage etc. Besides, some people use open defecation near the beel. In some portions, pipe and drain of the domestic toilets are open into the waterbody through which the waste products are drained into it. All these leads to the degrade the water quality and resultant water pollution.

Disappearing of the water body: Due to the more human encroachment some portion of the waterbody is disappeared. For his own benefits people construct a no. of bridges, culverts across the waterbody leading to the fragmentation of the waterbody into small segments. A decade ago, a bus stand was constructed on the waterbody by filling a considerable portion of it. All these leads to the disappearing some portion of the Morikolong waterbody.

Destruction of the bank vegetation:A few years ago, this area is under enormous green belt. But with the changing land use pattern man destroy this vegetation covers for their own purposes. The decreasing vegetation cover also have a negative impact on the environment.

Loss in aquatic biodiversity: Traditionally the Morikolong is the home of various fauna and flora. Due to more human encroachment the quality of the waterbody starts to degrade which leads to decrease aquatic floras. Extraction of the fishes from it also increasing in present day. Moreover, for their own profit the businessmen mix hybrid species of fish fauna in the waterbody. It harms the local fish species and extinction of some local species such as Darikana, Selekana, Kholihana etc. In past years, the natural calm environment of the waterbody attracts a large no of the migratory birds during autumn and winter which are now decreasing in large no due to increasing human presence and destroying the natural vegetation. There is no doubt that Morikolong has every possibility to develop a site of recreation where people can enjoy the natural beauties and refresh themselves. But the ever-increasing human activities in this region reduce this possibility very fast. Moreover, with the increasing no of commercial fisheries the local poor fishermen have to suffer as they are not allowed to catch fish. They are now compelled to change their traditional economic activities.



(Source: Changing Land Use Pattern and Human Impact On Wetland, Miss Banashree Devi)

10.4.3 ISSUES AND REQUIREMENT

10.4.3.1 Key elements to Encounter

- Degradation of water bodies
- Construction on riverbed
- Garbage dumping
- Eutrophication remediation from waterbody surface

Issues:

Several anthropogenic activities which include agricultural, industrial and construction of buildings have created tremendous pressure on waterbody environment which leads to threat upon water ecology. In this way this waterbody environment is being degraded day by day and several types of flora and fauna are extinct from the Morikolong. In the northern most part of the Morikolong mostly falls in urban environment and in this part, waterbody has been shrinkage near about 2.61 hac land from year 1987 to 2014. It is due to earth filling of Morikolong area for construction of bus stand and dumping ground for urban solid wastes. In the western most part where Kachalukhuwa village has located some people has constructed several multi storied building above the waterbody. Liquid effluents domestic sewages are throwing towards the Morikolong which may cause the degradation of waterbody environment. During winter season when water level falls down several agricultural activities has taken place in neighbouring areas of the Morikolong by the local people. These agricultural activities may also have resulted towards degradation of waterbody environment.

Requirement:

For wise use of waterbody resources, it is very important to assess the impact of socio-economic factors upon the waterbody environment in regards of management plan. For proper management of waterbody resources several Steps should be taken to protect the waterbody from encroachment and strict law should be implement for their protection to illegal encroachment. Alternative means of livelihood should be generated for the people who depend upon waterbody resources for their survival. It will reduce the exploitation of waterbody resources and killing of fish and fauna. In Morikolong large part of the area covered by water hyacinth is facing a major problem. The eradication of weeds from the waterbody on a regular basis should be taken so that it may increase nutrient status and phytoplankton productivity. This will help to increase fish productivity. Efforts should be made to educate the local people and create awareness about the importance of management and conservation of this waterbody. Successful management of waterbody resources depends upon how properly concern authorities adopt appropriate plan and in what way it should be implemented.

a. Eutrophication Remediation

Industrial effluents, run-off from agricultural fields, refuse and sewage, domestic wastes like food remnants, soaps, detergents, and sewage are dumped into lakes which break down and release nutrients in the lake. Microscopic organisms ingest these nutrients and survive on them. Following ingestion of carbonic elements, carbon dioxide is released, while some of the elements are converted into nitrates and phosphates. This is called oxidizing and uses up a lot of dissolved oxygen. The depleted levels of dissolved oxygen in water lead to a situation where other aquatic life-forms cannot survive. This process is called eutrophication.

Table 199 Effects of Eutrophication and Benefits of Removal

Effect of eutrophication	• Benefits of reducing eutrophication	• How benefits can be measured
Increased taste and odor problems in water supply	<ul style="list-style-type: none"> • Lower costs of treating water • Less need for substitute water (e.g., bottled water) 	<ul style="list-style-type: none"> • Treatment cost savings • Increased consumption of water and differential between prices of substitutes and municipal supply
Reduced visual and tactile qualities of water body	<ul style="list-style-type: none"> • Increased development around water body • Increased recreation • More diverse biota 	<ul style="list-style-type: none"> • Increased value of properties • Increased development of land • Increased expenditures on recreation • Prices for different species caught • Public WTP for improved ecosystem
Increased possibility of toxins in water	<ul style="list-style-type: none"> • Increased commercial and recreational fishing • More diverse biota • Increased water contact 	<ul style="list-style-type: none"> • Increased number and value of fish caught • Public WTP for improved ecosystem • Increased expenditures on recreation
Loss of water depth, surface area, and storage capacity	<ul style="list-style-type: none"> • Reduced need for alternative water supplies • Values of shoreline property preserved • Continued viability of fisheries • Continued viability of recreation 	<ul style="list-style-type: none"> • Avoided costs for dredging and substitute water supplies • Avoided losses in property values • Value of fish catches, which would not have taken place • Recreational expenditures which would have been lost • Public WTP for existence of lake, apart from use values



Figure 156 Eutrophication on the surface of Morikolong

10.5 WETLANDS AROUND NAGAON TOWN

Wetlands are important to us as they remove pollution, recharge groundwater supplies, control floods, and provide home for variety of plants and animals. Wetlands include swamps, marshes, bogs, and fens. Nagaon have 3 major wetlands which surrounded by marshy lands, ponds, and low-lying areas. These wetlands are so rich in flora and fauna and plays a major role to Nagaon's environment for conserving the nature and remove harmful substances from it.

Because of increase in urbanization around these wetlands, the ecology and beauty of these wetlands are declining.

- Encroachments and unauthorized filling
- Dumping of garbage
- Lack of facilities for environmentalist, students, public and tourist to enjoy scenic beauty and learn about wetland structure, functions, and biodiversity
- Threat to the Bio- diversity
- Visual pollution
- Flooding

10.5.1 MAHRUL WETLAND

Mahrul wetland is situated in south-east of the Nagaon city. Some private recreational activities are already established around this wetland i.e Jasingfaa Aqua Tourism Resort, which is a recreational park promoting aqua based fishing and boating activity for tourists and visitors.



Figure 157 Mahrul Wetland

10.5.2 RANTHALI WETLAND

These wetlands are in the south-west of Nagaon city, a little far from the city centre. The wetlands possess good amount of aquatic plants and fish which enhance source of income and support the livelihood pattern among the village people. Almost 80% of rural people have engaged themselves with the nearby wetlands, especially for agricultural activity, fishing and grazing of animals. The place is famous for Ranthali jewelries, an authentic jewelry making art.

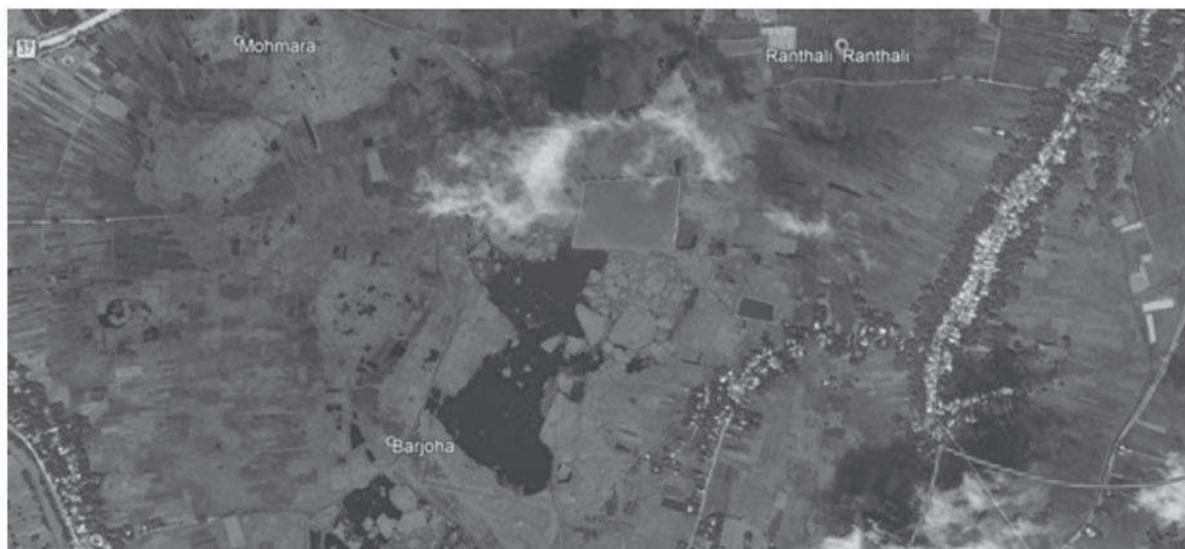


Figure 158 Ranthali Wetland

10.5.3 FAKOLI BEEL WETLAND

This wetland is on the south side of Nagaon city, this wetland some time witnesses migratory birds in season.



Figure 159 Fakolibeel Wetland

Wetlands are indispensable for the countless benefits or "ecosystem services" that they provide freshwater supply, food and biodiversity, flood control, groundwater recharge, and climate change mitigation. These wetlands need to be conserved

- Preserve the natural environment by utilizing the land for eco-friendly development (nature trails, timber structures, creation of ponds, tree planting etc.)
- Protect wildlife by creating breeding and feeding grounds for birds
- Promote recreational activities, walkways, bird watching etc.

- Prevent public land development for unacceptable uses and from encroachments
- Conserve the area for the use of future generation.
- To enhance the natural environment of the area combining the plains, marshy lands and wetlands which is rich in scenic beauty where recreational facilities could be introduced
- To protect wetland biodiversity by preserving a preferred environment, especially for birds and butterflies
- To create opportunities for students and naturalists to learn/explore wetland plants and animal species
- To improve as a tourist attractive site with providing recreational facilities
- To maintain and preserve the wetland for flood retention purposes

10.5.4 PROPOSED STRATEGIES

10.5.4.1 Key elements to Encounter

- Degradation due to pollution
- Construction around the marshy land
- Garbage dumping
- Encroachments and unauthorized filling
- Wetland areas have been drained and reclaimed for agriculture and urban sprawl.
- Need to save the wetlands:
- To protect wetland biodiversity by preserving a preferred environment, especially for birds and butterflies
- To create opportunities for students and naturalists to learn/explore wetland plants and animal species
- To improve as a tourist attractive site with providing recreational facilities
- To maintain and preserve the wetland for flood retention purposes.
- Preserve the natural environment by utilizing the land for eco-friendly development (nature trails, timber structures, creation of ponds, tree planting etc.)
- Protect wildlife by creating breeding and feeding grounds for birds
- Promote recreational activities, walkways, bird watching etc.
- Prevent public land development for unacceptable uses and from encroachments
- Conserve the area for the use of future generation

10.5.4.2 Restoration strategies:

a. Preserve and protect aquatic resources:

Existing, relatively intact ecosystems are the keystone for conserving biodiversity, and provide the biota and other natural materials needed for the recovery of impaired systems.

b. Restore natural structure:

Many aquatic resources in need of restoration have problems that originated with alteration of channel form or other physical characteristics, which in turn may have led to habitat degradation, changes in flow regimes and siltation. Stream channelization, ditching in wetlands, disconnection from adjacent ecosystems and shoreline modifications are examples of structural alterations that may need to be addressed in a restoration.

c. Work within the watershed and broader landscape context:

Restoration requires a design based on the entire watershed, not just the part of the waterbody that may be the most degraded site. Activities throughout the watershed can have adverse effects on the aquatic resource that is being restored. A localized restoration project may not be able to change what goes on in the whole watershed, but it can be designed to better accommodate watershed effects.

d. Address ongoing causes of degradation:

Restoration efforts are likely to fail if the sources of degradation persist. Therefore, it is essential to identify the causes of degradation and eliminate or remediate ongoing stresses wherever possible. While degradation can be caused by one direct impact, such as the filling of a wetland, much degradation is caused by the cumulative effect of numerous, indirect impacts, such as changes in surface flow caused by gradual increases in the number of impervious surfaces in the watershed. In identifying the sources of degradation, it

is important to look at upstream and up-slope activities as well as at direct impacts on the immediate project site. In some situations, it may also be necessary to consider downstream modifications such as dams and channelization.

e. Design for self-sustainability:

Perhaps the best way to ensure the long-term viability of a restored area is to minimize the need for continuous maintenance of the site, such as supplying artificial sources of water, vegetation management, or frequent repairing of damage done by high water events. High maintenance approaches not only add costs to the restoration project, but also make its long-term success dependent upon human and financial resources that may not always be available.

f. Restore native species and avoid non-native species:

Wetland's natural areas are experiencing significant problems with invasive, non-native (exotic) species, to the great detriment of our native ecosystems and the benefits. Many invasive species outcompete natives because they are expert colonizers of disturbed areas and lack natural controls.

10.5.5 WETLAND DEVELOPMENT IN NAGAON

Urban planning and design should explicitly include wetlands as natural infrastructure for nature conservation, water management (stormwater management, water supply and water treatment) and recreation. The integration of wetlands in the urban environment can deliver tangible benefits for the economy, biodiversity, and local communities.

10.5.5.1 Conservation of wetlands

- Community wetland management
- Agriculture and Silviculture
- Farming Activities in Wetlands and Buffers:
- Buffering around wetlands and marshy land



10.5.5.2 Protecting Ranthali and Mahrul Wetland

Another important waterbody in the planning area is Ranthali and Mahrul wetland, which is situated within MPA and is medium size wetlands in Nagaon region. At present, it is working as a recreational space for local people. It is proposed to provide a buffer of 50 m around this lake also. Moreover, it is important to preserve the water channels, drains, which bring

water to this wetlands as the disturbance of that will lead to water logging in certain areas and sufficient water will not reach to the lake. Thus, the primary drains bringing water to the lake are given a buffer of 50 m from the edge of the drain as per National Environment Policy.

10.5.5.3 Recreational activities around wetlands

- Bird watching
- Jogging trails around the wetland parks
- Cafes and local shops
- Leisure time fishing and angling
- Water sports activities



Nature friendly jogging track

Commercials on Wetland



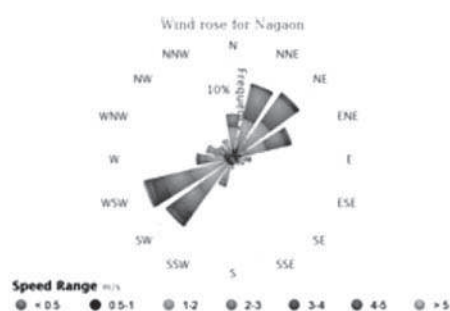
Water Sport over wetland parks

10.6 AIR QUALITY

10.6.1 WIND IN NAGAON

The wind direction of Nagaon annually is north of north-east and north-east and equally in west of south-west and south-west.

The average wind speed in Nagaon is 1.8 m/s with the maximum wind speed of around 6 m/s. The average ambient temperature remains 23.4°C, varies from 10.6°C to 35.6°C. The average relative humidity remains around 83.3%, varies from 44% to 99.8%. The station pressure varies from 975 hPa to 958 hPa, averaged around 987 hPa. Windrose of Nagaon shows that predominantly wind blow from the WSW - about 14.75% of all wind directions.



(Source: Indian climate.com)

10.6.2 AIR POLLUTION

The Air quality index of Nagaon overall is good. The air is quite clear and have very minimal impact. The SO₂ is 5, NO₂ is 13 and PM10 is 42.

Avg. CP	5	13	42
I Hi	50	50	51
I Lo	1	0	0
BP Hi	40	40	51
BP Lo	0	0	0
IP	7	16	42
Pollutant	Conct. in ug/m3	Sub index	Sub Index check
PM10 -24hrs. avg.	42	42	1
SO2 -24hrs. avg.	5	7	1
NOX -24hrs. avg.	13	16	1

(Source: pollution control board, Nagaon)

The level of air pollution concentration in residential is less than 50 ug/m³ for particulate matter, in industrial 50-100 ug/m³ for PM. And SO_x and NO_x is less than 50 ug/m³. In commercial areas the particulate matter is between 80-100 ug/m³.

10.7 COMMON STRATEGIES

In order to mitigate the above mentioned environmental issues, few proposals have been given, which is an effort to protect the environment of the region.

10.7.1 PROTECTION OF WATER BODIES

Water is the most precious gift of nature. Today, both surface and subsurface water in India and other South Asian cities is facing huge quantity and quality threat. Thus, it is crucial to protect the available source of water i.e. rivers, lakes, ponds, water channels etc. These waterbodies not only provide drinking water, support livelihoods and biodiversity but also control the rate of runoff and subsequently control the runoff. Nagaon Region has Three major water bodies namely, Mori Kolong, Mahrul and Ranthali beel. Considering the ecological importance of these wetland few proposals are given, which are as below.

10.7.1.1 Mori-Kolong

It becomes of utmost importance to preserve a waterbody of this much importance. In order to protect and conserve it, it is proposed to provide a buffer of 50 m around the Mori-Kolong beel. Apart from acting as a buffer zone, this area will be developed as a major recreational area for as well as surrounding regions. The water in Mori-Kolong comes from the following sources: (i) the run-off from the lake basin and direct interception by the water body; (ii) the water which is diverted by the natural dains through the channel to the lake. Therefore, it is important to conserve even the water channels, which brings water to the waterbody. A buffer needs to be given to the water channels as well.



Figure 160 Migratory Birds at Mori-Kolong

A large waterbody like Mori-Kolong attracting a large number of migrating birds from various corners of the region is itself an asset. However, this requires very careful management to see that it remains a place attractive to the migratory birds. The major problems which is faced by lakes of these kind is pollution arising out of various anthropogenic activities like free flow of untreated sewage to the waterbody, flowing of hydrocarbon elements along with the rainwater in the lake or untreated industrial effluent flowing into the waterbody. It is the general experience that development close to the lake borders with impervious cover invariably increases the phosphate content in the lake. Therefore, the following actions will be necessary to be taken by the local selfgovernment.

- Similarly, ensuring that no untreated industrial effluent/waste water reaches the lake.
- A regular system of monitoring the quality of water at the points where the storm water channel meet the lake.
- Regular census of birds and in case the coming of any particular species is going down, to enquire to the possible causes.
- To obtain the opinion of ornithologist about the status of planktons in the lake to keep a watch of algae bloom or hyacinth coverage of the water body.
- To collect the record of past incidences of death of fish with probable causes for such incident.
- The idea would be to see whether development of any kind is having any direct impact of the water quality and quantity of the feedstock for the migratory birds.
- Maintenance to see quality and safety of the areas where nests are built or where the eggs are laid.

a. Rejuvenation of waterbody by infrastructure development

The goals for conservation of Morikolong waterbody must be tailored to individual regions, specific to the problems of degradation and based on the level of dependence. This requires reconstruction of the physical conditions; chemical adjustment of both the soil and water; biological manipulation, reintroduction of native flora and fauna, etc.

b. Natures trails around waterbody

Nature trails are popular for wildlife viewing, walking, bike riding and other outdoor activities. Land managers often design and maintain trails in expansive public use areas. There is increasing interest from homeowners, business owners, wildlife enterprise entrepreneurs, schoolteachers, boy scouts, hospital personnel, parks department staff and others to develop and maintain nature trails on smaller landholdings.

Nature trails can be designed to minimize human disturbance and impacts on wildlife, plants, soils, and waterways. A well-designed trail can aid in land management, such as through simplifying timber evaluations or creating fire breaks. Properly built trails also provide opportunities to teach youngsters about wildlife, forestry, and natural resources.

To reduce impacts of trails and trail users on wildlife and plants, best trail practices are:

- Align trails along or near existing human-created edges or natural edges rather than bisecting undisturbed areas.
- Keep a trail and its zone of influence away from specific areas of known sensitive species.
- Avoid or limit access to critical habitat patches.
- Provide diverse trail experiences so that trail users are less inclined to create trails of their own.
- Use spur trails or dead-end trails to provide access to sensitive areas because these trails have less volume.
- Generally, concentrate activity along trails rather than disperse it.
- Keep trail construction impact as narrow as possible.
- Concentrate weed control at road and trail crossings, trailheads, and riparian areas

c. Water Sport Activities

Water sport activities like boating, Jet ski, riding need to be introduced for public recreational activities.



11 DISASTER MANAGEMENT

11.1 INTRODUCTION

Disaster is an undesired calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. Disasters are usually caused by nature but in some cases, it can be caused by human actions as well. Disaster can be broadly classified into Water and Climate related, Geology related, and Accident related. India has been traditionally vulnerable to natural disasters on account of its unique geoclimatic conditions. Floods, droughts, cyclones, earthquakes and landslides have been recurrent phenomena. About 60% of the landmass is prone to earthquakes of various intensities; over 40 million hectares is prone to floods; about 8% of the total area is prone to cyclones and 68% of the area is susceptible to drought.

At the national level, the Ministry of Home Affairs is the nodal Ministry for all matters concerning disaster management. The Central Relief Commissioner (CRC) in the Ministry of Home Affairs is the nodal officer to coordinate relief operations for natural disasters. The CRC receives information relating to forecasting/warning of a natural calamity from India Meteorological Department (IMD) or from Central Water Commission of Ministry of Water Resources on a continuing basis. The Ministries/Departments/Organizations concerned with the primary and secondary functions relating to the management of disasters include India Meteorological Department, Central Water Commission, Ministry of Home Affairs, Ministry of Defense, Ministry of Finance, Ministry of Rural Development, Ministry of Urban Development, Department of Communications, Ministry of Health, Ministry of Water Resources, Ministry of Petroleum, Department of Agriculture & Cooperation, Ministry of Power, Department of Civil Supplies, Ministry of Railways, Ministry of Information and Broadcasting, Planning Commission, Cabinet Secretariat, Department of Surface Transport, Ministry of Social Justice, Department of Women and Child Development, Ministry of Environment and Forest, Department of Food.

Nagaon comes under Bhrahmaputra valley. The Brahmaputra valley with an average elevation from 50 to 120 m above m.s.l. represents an unique landscape comprising of a 800 km long and 130 km wide valley delimited by the low-lying valley to its south and the Karbi Anglong hills and Barail range comprising the North Cachar hills in the central part. Nagaon district has got very high reserves of Glass Sand. Thus, it can be unanimously vouchsafed that the geology of Assam depicts a rich repository of minerals with its diversified geographical structure.

11.2 CURRENT SCENARIO

River Kollong is a spill channel of river Brahmaputra having its intake point near Jakhalabandha in between Kukurakata hill and Hatimura hill. The river traverses about 199.67 Km through Nagaon district and finally outfalls into the river Brahmaputra near Chandrapur in Kamrup district. The hydrology and topography of the catchment area of the river was such that apart from receiving water from the hilly streams, the river carried the flood water from the over flooded Brahmaputra river inundating the low-lying areas of Nagaon and Morigaon district and creating havoc among the people. Even the Nagaon town was under threat due to such flooding by Kollong river. The river Kollong had become dead for a length of about 37Km upto Missa town after it was choked at the mouth due to continuous deposition of debris, water hyacinth etc. year after year. Two nos. of streams namely Missa and Diju feed Kollong at upstream of Nagaon town. Nagaon is affected by wind and cyclone, wind speed of more than 55m/s and are more vulnerable to cyclonic storms. Occasional cyclones do occur in western Assam their severity is more during monsoon.

Records of Rainfall in the district are available for eleven stations for periods ranging from forty to fifty years. The average annual rainfall in the district was 2221.15 mm in 2010. The rainfall in the district generally increases from the south towards the north. About sixty-eight per cent of the annual rainfall is received during the period of June to September, July being the rainiest month of the year. Rainfall mostly as thundershowers occurs in the pre-monsoon months of April and May and in October.

The basic objective of current Disaster Management Action Plan is to protect all the residents and the wealth of the region from all sort of untoward incidents through the following objectives:

- To prevent loss of human lives and property.
- Institutionalization of disaster management in district administration level.
- Encourage a culture of disaster preparedness.
- Vulnerability reduction and disaster mitigation through better planning process.
- Creation of best government mechanism to handle and unprecedented events.
- Instant response and effective decision making in disasters.
- Better coordination of relief and rehabilitation in the aftermath of a disaster.
- Better coordination of all line departments in disaster management.
- Regular updates of resources in and around the district.

11.2.1 FLOOD

Floods are the results of natural and physical phenomena. They are very much dependent upon the pattern of rainfall, topography of the basin and river channels configuration.

In the year 2004 three devastating waves of flood occurred and created havoc among the vulnerable population of the district. In that year, flood waters of Kopili inundated many areas in Kampur, Raha and Hojai circles. Jamuna River also inundated areas in Doboka circle of Nagaon district disrupting road communication between Doboka and Diphu. During the flood in 2004, on 8-10-04, National Highway was overtopped at Nellie. However, one RCC Bridge was badly affected on 10-10-04 morning after which vehicular traffic between Guwahati and Upper Assam was totally disrupted. In Nagaon district, road communication has been disrupted at Kampur-Baithalangshu, Kampur-Bakulguri, Kampur – Kathiatoli as the NH-37 damaged at Raha due to RCC bridge collapse. Army help has been sought for restoration. In the district about five lakh people have been affected by the flood in the year 2004.

The drainage system plays a key role during flood, at present Nagaon have total length of the existing drainage in the city is 140 km out of which 40% of the drains are lined and 60% of the drains are earthen. About 85% drains are maintained by NMB and 15% drains are maintained by APWD.

The districts that are severely flood affected are Nagaon. More than 50% of the area of these districts are flooded leading to huge socio-economic losses for the districts. The reliability and effectiveness of the embankments from the Brahmaputra flooding are generally insufficient because of structural deterioration and ongoing riverbank erosion. River erosion is resultant issue of the floods and which leads to severe land loss.

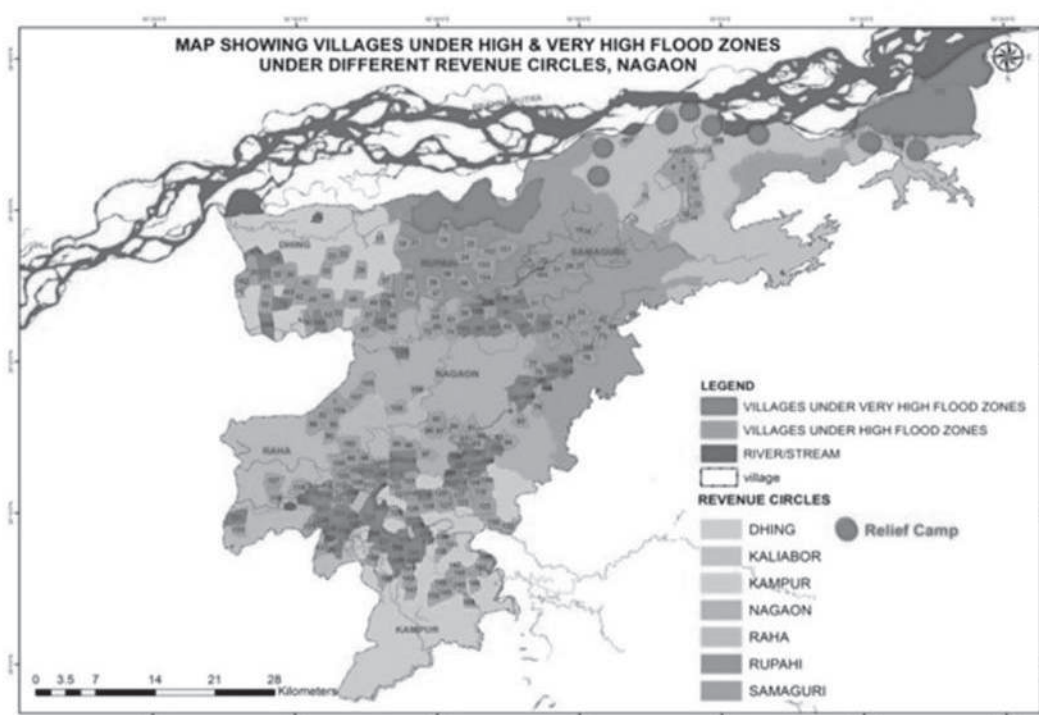


Figure 161 Village Vulnerability Map, Nagaon District

Table 200 Flood event and details

Sl. No.	Disastrous Event	Year of Occurrence	Area Affected	Name of localities	Population affected
1	Flood	2017, 2004	Nagaon town and south Nagaon,	Dhemaji, Lakhimpur, Biswanath, Kamrup Morigaon, Hojai and Nagaon District.	15000 People were affected

(Source: Assam disaster management report)

11.2.2 EARTHQUAKE

Around 58 % of the territory of India is vulnerable to earthquake, and the country has experienced 3 main earthquakes in the past few decades. The state of Gujarat has experienced a major earthquake in January 2001, Jammu & Kashmir in October 2005, and Sikkim in 2011. The major consequences of any earthquake are widespread human and material losses, excessive damage to infrastructure and services. According to the Geographical Survey of India, Seismic Zoning Map of the country, Silchar region lies in Zone-V which is said to be the most active seismic zone in the Country. Like the rest of Assam, the Nagaon district has always been subject to earthquakes as it lies in the zone of seismic disturbances. The great earthquake which occurred on June 12, 1897 had its epicentre in the Shillong plateau. It had a magnitude of 8.5 Richter and was probably one of the greatest earthquakes ever recorded. The shock was felt over an area of 1,750 km² and destruction of stone buildings was almost universal in an area of 30,000 km² including Shillong, Goalpara, Gauhati, Nagaon and Sylhet area of Bangladesh. Land slips and an earth fissure was very abundant over the whole of the epicentral area. In Nagaon most of the government buildings including the Circuit House, Court building and the Deputy Commissioner's bungalow were rendered unfit for habitation. Part of the District Jail wall collapsed and the metal road along the side of the Kolong was split up with yawning fissures. The earthquake of August 15, 1950 had its epicentre at 28.5° N and 96.7° E. and had a magnitude of 8.6 Richter. The estimated area of north-eastern Assam over which extensive and heavy damage occurred was 1,900 sqmt.

Table 201 Earthquake in Nagaon

Sl. No.	Disastrous Event	Year of Occurrence	Area Affected	Name of localities
1	Earthquake	1897, 1950	Around 1750 sqmt area, Kolong river altered	All the Five circles of District

(Source: Department of Disaster Management, Nagaon)

11.2.3 DROUGHT

The southern part of Nagaon district in central Assam valley and adjoining parts of Karbi Anglong form a rain-shadow zone where annual rainfall is as low as 800-1200 mm. Water scarcity is a potential constraint for the people living in these areas. Absence of effective irrigation systems or water harvesting practices adds to the vulnerability of the people. Lumding, located centrally in this zone shows a decline in rainfall at a rate of 2.15 mm per year. As a result, water crisis might aggravate in this region in the coming years.

Table 202 Drought in Nagaon

Sl. No.	Disastrous Event	Year of Occurrence	Area Affected	Name of localities
1	Drought	2009	Nagaon District	All the circles of District

(Source: Department of Disaster Management, Nagaon)

11.2.4 RIVER EROSION

River erosion is a season specific calamity observed in certain period mostly in fixed seasonal interval. In rainy season specifically from months April to July, The Brahmaputra has unleashed its destructive force again in Assam. The sudden massive erosion caused by the river along its southern banks in Nagaon district Over 800 hectares of land at Hatimura, Baneswar, Baghjan and Kukurakata villages has been severely affected. Even the western extension of Kaziranga National Park is faced with the threat of erosion. Bank erosion prone area of the streams and Rivers of Assam are to be covered by different soil conservation measures in order to check the continuous loss of agricultural land **Gully erosion** is the main erosion problem

Table 203 River Erosion in Nagaon

Sl. No.	Disastrous Event	Year of Occurrence	Area Affected
1	River Erosion	Every consecutive year	Nagaon town,

which damages a considerable area of agricultural land annually. Gullies are the formation in the soil by the surface runoff water initiating sheet, rill and finally the gullies resulting in accountable loss of top fertile soil. Gully control structures like spillways, check dams etc. are constructed to stop further advancement of the gully heads and fingers and to improve the moisture regime in the command areas which results in increase in production from agricultural land.





Figure 162 Land Gully erosion measures



(Source: Department of soil, Nagaon)

11.3 SEASONAL HAZARD ANALYSIS

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Cyclone	x	x	x	x	x	x	x	x	x	x	x	x
Flood						←	←	←	←			
Drought						→	→	→	→			
Earthquake	←	←	←	←	←	←	←	←	←	←	←	←
Sunstroke	x	x	x	x	x	x	x	x	x	x	x	x
Fire		←	←	←								
Chemical Accidents	x	x	x	x	x	x	x	x	x	x	x	x
Boat capsize						←	←	←	←			
Epidemic						←	←	←	←			
Accident	←	←	←	←	←	←	←	←	←	←	←	←
Lightening				←	←	←	←	←	←			

Figure 163 Seasonal hazard analysis

(Source: Department of Disaster Management, Nagaon)

11.4 VULNERABILITY (RISK AND HAZARDS ANALYSIS)

Table 204 Risk and hazard Analysis

Type of Hazard	Potential impact	Vulnerability	Vulnerable areas
Cyclone	NIL	-	-
Flood	Loss of crops, human lives and animals and properties damage	Communication facility, Agriculture & Horticulture. Private infrastructure- Houses, Irrigation sources, Electrical installations. Drinking water sources, Educational institutions, and Livestock.	All the Development Block areas.
Drought	Drought human life and Pets	Loss of Human lives & pets	Entire District
Earthquake	Human Lives & Structures both public & Pvt.	Loss of Human Lives & Structures both public & Pvt.	Entire District
Fire	Lives & property	Loss of Human Lives & Structures both public & Pvt.	Entire District
Chemical Accidents	Less possibility	Less possibility	Less possibility
Boat Capsize	Lives	Loss of Human lives & Pets	Inhabiting areas of river banks
Epidemic	Human lives & Pets	Loss of Human lives & Pets	Entire District
Accident	Human lives	Loss of Human lives & Pets	Alongside NH 36 & 37, Urban & Semi Urban approach roads and areas.
Lightening	Human lives	Loss of Human lives & Pets	Entire District

(Source: District Disaster Management Plan, 2020, DDMA, Nagaon)

11.4.1 INFRASTRUCTURE VULNERABILITY AGAINST HAZARDS

Table 205 Infrastructure Vulnerability against hazard

Vulnerability	Flood		Accident		Fire	
	Population	Area	Population	Area	Population	Area
Road network	15,00,000 appx.	Nagaon Sadar, Raha, Kampur, Dhing, Rupahi, Samaguri, Kaliabor Revenue Circle Areas 2800 sq k.m.	6,25,000 appx.	Along NH 36 & 37 and urban area approach roads.	-	-
Water supply	15,00,000 appx.	Nagaon Sadar, Raha, Kampur, Dhing, Rupahi, Samaguri, Kaliabor Revenue Circle Areas 2800 sq k.m.	-	-	-	-
Hospital	50,000 appx.	All Development Block Areas	-	-	1500 appx.	Civil Hospital Nagaon,
Food stocks & supplies	15,00,000 appx.	Nagaon Sadar, Raha, Kampur, Dhing, Rupahi, Samaguri, Kaliabor Revenue Circle Areas 2800 sq k.m.	-	-	15,00,000 appx.	Nagaon Sadar, Raha, Kampur, Dhing, Rupahi, Samaguri, Kaliabor, Revenue Circle Areas 2800 sq k.m.
Communication (System)	15,00,000 appx.	Nagaon Sadar, Raha, Kampur, Dhing, Rupahi, Samaguri, Kaliabor Revenue Circle Areas 2800 sq k.m.	-	-	-	-
Embankments	15,00,000 appx.	Nagaon Sadar, Raha, Kampur, Dhing, Rupahi, Samaguri, Kaliabor Revenue Circle Areas 2800 sq k.m.	-	-	-	-
Bridges	15,00,000 appx.	Nagaon Sadar, Raha, Kampur, Dhing, Rupahi, Samaguri, Kaliabor Revenue Circle Areas 2800 sq km	-	-	-	-

(Source: District Disaster Management Plan, 2020, DDMA, Nagaon)

11.5 MITIGATION PLAN

Any disaster management plan or emergency management plan consists of four phases, namely: Mitigation, Preparedness, Response and Recovery. The mitigation component in an emergency management plan is aimed at reducing the risk, impact, effects of a disaster. Hence careful planning in the mitigation phase is important to reduce or eliminate the Longterm risk to human life, property from natural and manmade calamities. It's important to have mitigation plans led by local community, working together to identify, plan for in the event of a disaster and reduce vulnerabilities and promote long term personal and community resilience and sustainability. Mitigation plans can concentrate on both pre-disaster and post disaster efforts to reduce the impact of the disaster.

Pre-disaster Mitigation should focus on projects and interventions to address natural and man-made disaster to reduce risk to the population and property. This is mainly achieved by strengthening the resilience of National/State Infrastructures. Post-disaster Mitigation efforts are primarily designed to reduce future damage in an affected area and decrease the loss of life and property due to the incidents following the disaster. The essential steps of hazard mitigation are: -

- Hazard Identification.
- Vulnerability Analysis.
- Defining a Hazard Mitigation Strategy.
- Implementation of Hazard Mitigation Activities and projects.

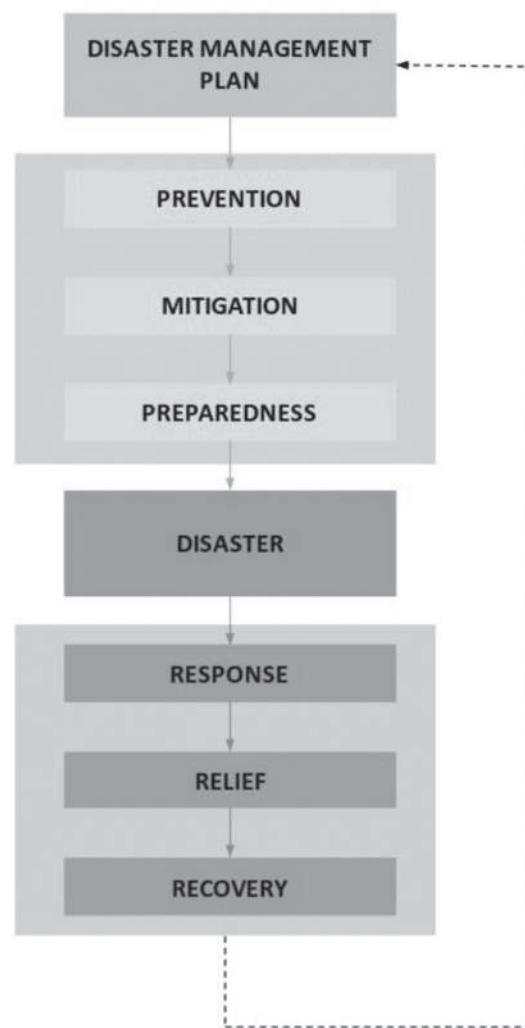


Figure 164 Disaster management plan

The Nagaon region is more prone to Floods & Cyclone than any other natural disasters hence the disaster vulnerable area mitigation plan focuses on flood and cyclone related eventualities and how can it be mitigated and have a better preparedness. It is important to note that disaster management is an integrated task involving various government departments of region and the plan should focus on prevention, preparedness, mitigation, response, and relief measures.

11.5.1 EMBANKMENTS AND VULNERABLE REACHES OF THE DISTRICT

Table 206 Embankments and Vulnerable Reaches of the District

Dyke	Area	Length	Benefiting area
Hatimura dyke	Kaliabor Revenue Circle	3.595 km	1329 ha
Brahmaputra dyke		88.845 km	48,000 ha
Bihdubi		300 mt. (dist. from dyke)	2 km
Sullung Borghuli		200 mt. (dist. from dyke)	8 km
Bogamukh		500 mt. (dist. from dyke)	2 km
Kopilli L/B dyke from Charaihagi to Tuklaitup		27.4 km	
Kollong dyke from Phulaguri to Molankata		8.6 km	-
Extension along R/B of Kollong River from Phulaguri to Haibargaon		16.2 km	-
Embankment along R/B of Nonoi & Haria from Tulshimukh to Hariaghat :		9.5 km	-
F/E along L/B of Nonoi from Bamuni to Doboka PWD Road		8.5 km	-
NTP Dyke on both bank of river Kollong:		6.2 km	-

11.5.2 PREVENTION PLAN

As part of prevention of the said natural disasters, the following measures can be adopted by concerned government departments to avoid and minimize the impacts of natural disasters.

- The Public Works Department should monitor the major water bodies like rivers,
- streams, lakes for constant flow of water, rising levels, and identify potential areas along the water bodies which need additional embankment or revetments, and these works should be implemented on priority before the onset of the season.
- Power and Communication should carry out through inspection of power lines, communication lines for defects and rectify them. Trees and branches which may damage power and communication lines should be trimmed or removed.
- Health department should ensure that the primary and community health centers are equipped with medicines and medical staff. Preventive vaccines for epidemics should be stocked in adequate quantity. Chlorination of drinking water should be ensured to avoid the outbreak of epidemics in the event of cyclones and floods.
- The Department of Disaster Management is the nodal agency in the Nagaon Region and has already handled several flood and cyclone situation in the region. From this experience, it should be able to identify the low lying and vulnerable areas and the population of such places must be warned to be alert and to be ready to move to the cyclone shelters or to safer areas or to the relief camps in case of warning of disaster.
- The Department of Civil Supplies & Consumer Affairs should decide for creation of buffer stock of food grains by making required withdrawal from the Food Corporation of India. Also, adequate quantities of Kerosene and diesel should be procured and made available through the Fair Price Shops.
- Department of Agriculture should take steps to publicize precautionary measures to be taken to save the standing crops in the vulnerable areas. Farmers should be encouraged to have platforms in their fields to stock the crops. Desilting of public and private irrigation channels should be ensured for quick drainage of paddy fields.
- Fisheries & Fishermen Welfare Department shall alert all the coastal villages and hamlets about the impending natural calamity and advice the fishermen not to venture into sea till normalcy is restored.
- Department of School Education shall keep all schools ready for accommodating the evacuees

and keep the Central Kitchens to function around the clock with in charge of the centres. NCC and NSS students shall also be grouped to send them for relief works.

- Transport Department should keep ready the list of sufficient numbers of earthmoving vehicles, transportation vehicles such as trucks, tractors, tippers, poclains, mini buses etc. Further, all the listed vehicles allocated in connection with calamity has to be kept in roadworthy condition for using them in emergency.
- Fire Services Department shall keep available sufficient number of rescue materials, like life jackets, buoys, ladders and ropes.
- Department of Animal Husbandry & Animal Welfare should store fodder, cattle feed, poultry food etc. and also carry out the inoculation of animals against epidemics. The Key Village Units should harbor stray cattle with shelters.
- Local Bodies shall make arrangements for availability of Generators and pump sets at short notice. For areas with waterlogging Local bodies should clear the L & U type drains which normally clog due to plastic materials and silt.
- The Police Department shall set up a Search & Rescue Team which shall contain at least 20 Police Personnel for each jurisdiction of the Superintendent of Police.
- Similarly, the Fire Services Department shall set up Search & Rescue Team consisting of at least 6 members of each Fire Service Station.

11.5.3 MITIGATION AND PREPAREDNESS PLAN

Pre- disaster planning consists of activities such as disaster mitigation and disaster preparedness. Disaster mitigation focuses on the hazard that causes the disaster and tries to eliminate or drastically reduce its direct effects. The best example of mitigation is the construction of embankments and construction of proper drainage system in flood prone areas to avoid floods. The other example includes retrofitting of weak buildings to make them earthquake resistant. And preparedness focuses on plans to respond to a disaster threat or occurrence. It takes into account an estimation of emergency needs and identifies the resources to meet the needs. The first objective of the preparedness is to reduce the disaster impact through appropriate actions and improve the capacity of those who are likely to be affected most. The second is to ensure that ongoing development continues to improve the capacities and capabilities of the system to strengthen preparedness efforts at community level. Finally, it guides reconstruction so as to ensure reduction in vulnerability. The best example of preparedness activities are the development of community awareness and sensitization system through community education and administrative preparedness by way of stockpiling of supplies, developing emergency plans for rescue and relief. For a successful mitigation plan it is necessary to

identify short-, medium- and long-term mitigation measures for various hazards for structural and non-structural risks and damages. Mitigation measures should focus to reduce both the effect of the disaster and the vulnerable conditions to it, in order to reduce the scale of a future disaster and its impacts. Mitigation measures should also focus at reducing physical, economic and social vulnerability of the region at the event of the disaster. Cyclone mitigation and preparedness largely hinges on the preparedness of the community. The following steps can be taken to reduce the risk in the unfortunate event of the said natural disasters.

- Restore Communication networks
- The task force in association with Search & Rescue Teams of Police and Fire should thoroughly search the affected area for survivors and injured.
- In case of heavy flooding and inundation, vehicular access may be restricted, and hence suitable rafts/boats should be used to rescue and evacuate the people affected by the floods.
- The waterlogged in low lying residential areas should be pumped out and the pumped-out water could be let through the nearest natural drain or canal. Also, fire engines can be deployed to pump out water from affected areas during emergencies.

Table 207 Institutional Framework for Disaster Management

Type of Sector	Sub-sector	Mitigation measures	Responsible Deptt.	Time Frame
Infrastructure Development	Road	Repair/ Restoration of vulnerable points on Roads before onset of monsoon	PWD / DRDA	During Normal time and immediately
	Embankment	Repair of vulnerable points in river/ canal Embankment during free flood period.	Water Resource / Irrigation / Minor Irrigation.	During Normal time and immediately
	Bridge	Repair/ Restoration of vulnerable points on bridge before onset of	PWD, NH	During Normal time.
	Safe shelters	Ensuring proper maintenance of shelter places, with drinking water and sanitation facility	COs, BDOs, PWD (Buildings), Inspector of Schools	During Normal period.
	Communication	Ensure maintenance and proper functioning of electronic communication system	BSNL	Round the year
	Drinking water and sanitation	Immediate Response for repair/ replacement of tube wells / Pipe water	PHE / Health department.	During Normal time and immediately
	Power	Immediate response for repair of electric line and supply	PWD (Elctl)/ ASEB Diphu	Round the year.
Health / Animal Husbandry	Vaccination	Adequate stock piling of vaccines should be ensured for vaccination before	CMO, DVO, NGOs.	During Normal time and immediately
	Training	Training programme of common people should be programmed for health care, sanitation and first aid from village level to district	CMO, DVO, NGOs.	During normal period.
Livelihood Sector	Awareness	Creating awareness among general public during normal time to insured human life.	Leading NGOs.	During Normal Time.
	Agriculture	Alternating cropping pattern/flood resistance crops/ Crop Insurance /Technical Guidance to the cultivators/ Technical assistance, use of	Dy. Director Agriculture.	During Normal time and immediately after disaster.
Insurance	IEC activities	By way of IEC activities through walling posters, street play, village task force/ volunteers	Agril Dept. /CBO/ NGOs	During normal period.
	Livelihood and Life	By way of IEC activities through walling posters, street play, village task force/volunteers	By leading NGOs/ CBOs	During normal period.
Planning and Response	Relief/ Rehabilit ation, Preparedness, Awareness	<ul style="list-style-type: none"> Regular updation of departmental contingency plan. Community awareness and involvement of NGOs Regular conduct of mock-drill. Co-ordination among diff. agencies and sharing of information. 	Line departments, NGOs, CBOs.	During normal time.

(Source: District Disaster Management Plan, 2020, DDMA, Nagaon)

- Any breach in rivers, streams or natural drains should be protected with adequate sand bags or creation of temporary embankments to avoid further damage to property and human life.
- In case of heavy storms, power supply to areas which are in the primary path of the storm can be disconnected to avoid hazards due to breakage of power lines. Provisions should be made to provide generators for temporary power supply to storm affected areas.
- Relief camps should be opened in appropriate locations where a large number of people are affected.

11.5.4 RESPONSE PLAN

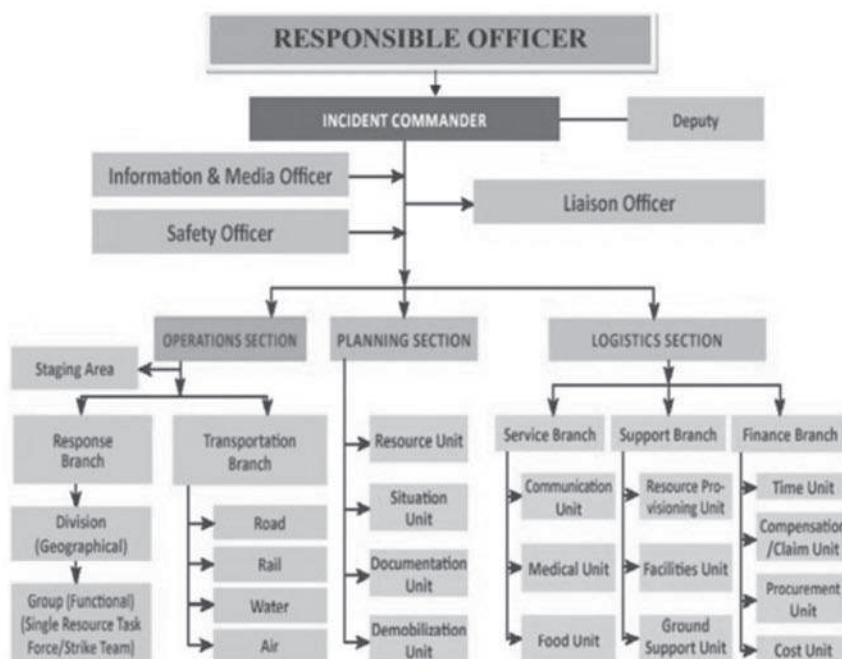
Response measures are those taken immediately prior to and following disaster impact. It is important to have clear organization structures with established line of authority within the government mechanism to handle the response plan in case of natural calamities. The plan should detail out the various phases from early warning to rehabilitation and the roles that agencies play in reaching the vulnerable and affected to identified disaster support infrastructure located in the Nagaon Region. Response plans include formation of functional teams and providing plans for transportation, evacuation, search and rescue, and rehabilitation. They are supported by supervisory zone-based teams assuring food, shelter, water, medicine to the vulnerable in order to uphold physical and psychological health. Survey and assessment should be the part of response activity.

Coordinated IEC activities should be initiated well in advance.

- Mock drill of preparedness should be carried out twice in a year. The mock rehearsal should start from the Control Room. This will help in finding out the preparedness level for the district level functionaries.
- Make separate plan of operation and list of required materials, tools machineries for each kind of disaster.
- Train the rescue forces with the equipment and specialize them for the different types of disaster

by the experts.

- Train the Panchayat leaders / village volunteers/ Villagers for helping the affected people for the disaster of their concern.
- Half yearly review the stock of men, materials and machineries of all lined departments.
- Approach to NDMA and ASDMA for any kind of assistance to the line departments for up-keepment of their machineries and strengthening the resources.
- Warning system through Police Control Room (24x7) DDIPR/AIR/DIO.
- The Incident Command Officer shall organize regular coordination meeting with all DM Committee Members, Head of office, Public leaders, NGO and senior citizen in consultation with the Chairman.
- The Incident Command Officer will liaise with all Head of office, NGO, Public Leaders and other organizations to keep their machineries and manpower in readiness to face occurrence of any type of natural disaster.
- The Incident Command Officer shall keep record of all parameter which might
- Indicate occurrence of any type of natural disaster and intimate the concerned higher
- Authority in weekly / daily basis.
- The RRTs (Medical & Police) will be alerted by the Incident Command Officer.



Aims of disaster response:

The overall aims of disaster response are:

- To ensure the survival of the maximum possible number of victims, keeping them in the best possible health in the circumstances.
- To re-establish self-sufficiency and essential services as quickly as possible for all population groups, with special attention to those whose needs are greatest: the most vulnerable and underprivileged.
- To repair or replace damaged infrastructure and regenerate viable economic activities. To do this in a manner that contributes to long term development goals and reduces vulnerability to any future recurrence of potentially damaging hazards.
- In situations of civil or international conflict, the aim is to protect and assist the civilian population, in close collaboration with National and International agencies.
- In cases involving population displacements (due to any type of disaster) the aim is to find durable solutions as quickly as possible, while ensuring protection and assistance as necessary in the meantime.

Disaster Response Activities:

Warning refers to information concerning the nature of the danger and imminent disaster threats. Warnings must be rapidly disseminated to government officials, institutions and the population at large in the areas at immediate risk so that appropriate actions may be

taken, namely, either to evacuate or secure property and prevent further damage. The warning could be disseminated via radio, television, the written press, telephone and PA system, VHF equipments and cell phone.

Search & Rescue (SAR):

is the process of identifying the location of disaster victims that may be trapped or isolated and bringing them to safety and medical attention. In the aftermath of Cyclone and Floods, SAR usually includes locating stranded flood victims, who may be threatened by rising water, and either bringing them to safety or providing them with food and first aid until they can be evacuated or returned to their homes. In the aftermath of Earthquake or Landslide, SAR normally focuses on locating people who are trapped and/ or injured in collapsed buildings.

Evacuation and Shelter Management:

Evacuation involves the relocation of a population from zones at risk of an imminent disaster to a safer location. The primary concern is the protection of life of the community and immediate treatment of those who may be injured. For evacuation to work there must be: * A timely and accurate warning system, * Clear identification of escape routes, * Designated shelter places for refugees with proper shelter management policy. District Disaster Management Authority has identified places like Schools, Colleges, Community Halls and Places of Worship in the district to be used as Temporary shelter places.

11.5.5 RELIEF PLAN**During the Disaster.**

- Disseminate the warning of disaster from DDR&IC to all concerned destination in single attempt by using mass sms, announcement through radio, through mass voice mail and ask the people who are likely to be affected, to take shelter in safer places.
- Immediate deploy the forces to clear the route of search & rescue and also to clear the traffic from the route of rescue.
- Command to the forces, NGO, SHG & volunteers to rush immediately to the affected area for search and rescue with all pre-enlisted tools and equipment for disaster.
- During the time of occurrence of disaster, the

Nodal Officer shall liaise with all Head of office, Public Leaders and other organizations and initiate prompt measures to prevent loss of human lives and property damage.

- The Nodal Officer shall initiate immediate necessary measure for evacuations, organize Search and Rescue teams with consultation with the concerned Member which have been entrusted to this work.
- If necessary, the Nodal Officer will initiate setting up of Relief Camp for the affected people in a safer place and ensure proper supply of safe drinking water, electricity, medical facilities and rations etc. with the help of concerned departments to the relief camp.

Post Disaster:

- A Post- disaster evaluation should be done after the withdrawal of relief and rehabilitation activities in order to assess
- The nature of state intervention and support,
- Suitability of the organizational structure,
- Institutional Arrangements,
- Adequacy of Operating Procedures,
- Monitoring mechanism,
- Information tools,
- Equipments,
- Communication System, etc.

The impact studies on the aforesaid operations for long term preventive and mitigation efforts are to be

undertaken.

Evaluation exercises may be undertaken to understand the perceptions about disaster response in terms of

- Adequacy of training
- Alert and warning system,
- Control Room functions,
- Communication plans,
- Security,
- Containment,
- Recovery procedures,
- Monitoring.

11.5.6 RECOVERY

Rehabilitation and reconstruction comes under recovery phase immediately after relief and rescue operation of the disaster. This post disaster phase continues until the life of the affected people comes to normal. This phase mainly covers damage assessment, disposal of debris, disbursement of assistance for houses, formulation of assistance packages, monitoring and review, cases of non-starters, rejected cases, no occupancy of houses, relocation, town planning and development plans, awareness and capacity building, housing insurance, grievance redresses and social rehabilitation etc.

In the unfortunate event of a natural calamity like a cyclone or flood its important focus on the methods and activities to restore lifeline support physical infrastructure like adequate water supply, power and communication networks, accessibility to the site. These must be described in the disaster management plan- relief & recovery part. In the river side of the Nagaon the communities are depended on the specific infrastructure for their livelihood, and these should be identified and methods to restore them in short/medium/long term have to be identified and respective funding reequipments have to be made available and followed by speedy decision-making process.

In the District, the Nodal agency plays direct and active role in relief. The Deputy Commissioner office either directly or through assistance will inform to the nearest police stations, WT stations, administrative officers, and nodal agencies at Circle, Sub-Divisional and Dist. HQ by quickest means. For

timely assistance to the people affected by natural disasters it is necessary to have correct assessment of extend of damage to crops, public & private properties and loss of human lives and livestock. The emergency relief measures and relief measures in the aftermath of a disaster is generally carried out in compliance with Calamity Relief Fund Norms by Deputy Commissioner.

The task force is responsible for collecting the extend of the damages with respect to number of houses damaged, loss of human lives, number of persons injured, information about individual families, their income, property and assets. The zonal officer has to prepare a report on the same to be sent to the Deputy Commissioner. The mentioned assessment is to be carried out on priority basis so that the Nodal Department in the district Region which is the Department of Disaster Management can extend relief assistance in time in order to mitigate the effect of the natural disaster.

Post Disaster Reconstruction and Rehabilitation:

Post disaster reconstruction and rehabilitation should pay attention to the following activities for speedy recovery in disaster hit areas. The contribution of both government as well as affected people is significant to deal with all the issues properly

- Damage assessment
- Disposal of debris
- Disbursement of assistance for houses
- Formulation of assistance packages
- Monitoring and review
- Cases of non-starters, rejected cases, non-

occupancy of houses

- Relocation
- Town planning and development plans
- Reconstruction as Housing Replacement Policy
- Awareness and capacity building
- Housing insurance
- Grievance redress.

Administrative Relief:

The district is the primary level with requisite resources to respond to any natural calamity, through the issue of essential commodities, group assistance to the affected people, damage assessment and administering appropriate rehabilitation and restoration measures. The district level relief committee review the relief measures. When a disaster is apprehended, the entire machinery of the district, including the officers of technical and other departments, swings into action and maintains almost continuous contact with each village in the disaster threatened area.

Reconstruction of Houses/Roads Damaged / Destroyed: PWD (Roads) and PWD (Buildings) division

Pre & Post Disaster: - As PWD (Roads) Nagaon Divn and PWD (Buildings) Divn is an executive authority wherein all construction/ improvement works are executed through an agency or contractor, the restoration/ re-construction works during Pre & Post disaster period will be carried out as per existing APWD norms / specification and procedures as

current in the state.

Military Assistance:

If the district administration feels that the situation is beyond its control then immediate military assistance could be sought for carrying out the relief and rehabilitation operations including construction. Military carries out temporary construction works for road clearance, construction of emergency bridges, shelter places, camps, distribution of relief materials etc.

Medical Care:

Specialized Medical Care may be required to help the affected population. Preventive medicine may have to be taken to prevent outbreak of diseases. Vaccination after the disaster is very much important to prevent any disease to spread

Outside Assistance:

During disaster situations, considerable relief flows in from outside, thus there is an immediate need to co-ordinate the relief flow so that the maximum coverage is achieved and there is no duplication of work in the same area. Again the outside relief should be monitored so that the necessary items are made available.

Special Relief:

Along with compensation packages, essential items may have to be distributed to the affected population to provide for temporary sustenance.

11.6 CITY DISASTER MITIGATION PLAN

The points mentioned above should be part of a larger city or region level disaster management plan. The Disaster Management Act, 2005 has brought a change from Response & Relief oriented approach to proactive and comprehensive approach. This has encouraged many Indian cities to develop and formulate a City Disaster Management Plan, the same should be worked for Nagaon MPA as well to enable it to be better prepared in the case of natural disasters in the future. As part of the Master Plan 2045 the authority feels there is a need for a CDMP for the planning area covering the following general principles: -

- Risk & Hazard Assessment
- Planning
- Organization

- Resource Utilization
- Need for Specialist
- Training

Generally, the CDMP prepared for the planning area should include sectoral plans covering the following aspects of disaster & emergency management: -

- Overall Preparedness
- Rehabilitation
- Emergency Response
- Prevention
- Mitigation
- Recovery
- Reconstruction
- Capacity Building Plans

11.6.1 STANDARD OPERATING PROCEDURES OF THE LINE DEPARTMENTS*Table 208 Institutional Framework for Disaster Management*

Departments	Normal time activities	On receiving the warning	Post disaster
Revenue and Disaster Management Department	Mapping and accountability of disaster-prone areas and its 'entities	Assigning the work, coordinate task with different dept. and shifting people from disaster prone areas	Rescue operation, managing funds and segregate affected and non-affected areas
Police Department	Details of Data, contacts, and control rooms	Evacuating public from disaster prone area	Arrange law and order in disaster prone areas and coordinate with rescue team
Health Department:	Advance arrangement of lie saving medicine, vaccine and medical tools and training with DMT	Will ensure all the facilities at the hospitals and clinics activate staffs and mobile health units and organise local doctors and facilities.	Provide first aid and shifting people and focus on mobile medical facilities.
Public Health Engineering Department	Setting up control room and operating it, arrangement of drinking water facilities	Organise the team to check source of drinking water and standby arrangement for trucks and make available of chlorine tablets	Implement the alternative contingency plan to provide drinking water
Agriculture Department	Details of agriculture products and maintain departmental equipments such as diesel generators, dumpers, generator, cutters, tree cutters, ladders, ropes, flood lights, shovels, axes, hammers	assign the work to his subordinate officers and staff and ensure availabilities of resources	Will deploy the resources and manpower available to manage the disaster
Public Works Department	PWD inspects all the building, public infrastructure and to strictly observe the rules during the constructions regarding earthquake and cyclone proof materials.	Coordinate between control rooms and ensure all the staff to be on site	Provide resources, check resource availability
Forest Department	Details of veterinary centres, artificial insemination centres, veterinary dispensary, veterinary colleges buildings, vehicles, mobile dispensaries and equipment	To assign the work to be done by the subordinate officers and staff and to arrange for wireless, telephones, manpower, forest guard in advance to disseminate information	To carry out the duty assigned for search and rescue work. and engage the resources and manpower available to manage the disaster

12 SPATIAL STRATEGY AND LANDUSE PLANNING

12.1 APPROACH TO URBAN PLANNING

The objective of preparing a Master Plan for the Nagaon is to integrate the functions of NMB as a cohesive entity with the rest of the planning area. The region excluding NMB is largely depends on the core municipal area to sustain. NMB provides the necessary impetus and drive for the development of conurbation and rural area. Development of the Nagaon is critical for development of the entire northern district of Assam as it carries the Spiritual, Heritage and Cultural importance. Therefore, it is required to understand the issues of the area surrounding the Nagaon city so that the entire NMPA is fully integrated. Urban planning refers to the rational and judicious approach of allocating available land resources to different land using activities and for different functions consistent with the overall development vision / goal of a particular region. The main objectives of land use planning area

1. To promote efficient utilization and disposition of land ensure the highest and best use of land.
2. To promote desirable pattern of land uses to prevent wasteful development.
3. To preserve areas of ecological, aesthetic, historical and cultural significance.

In the chapter, it details out the visions, goals & planning concepts adopted for the preparation of GIS Based Master Plan for Nagaon Planning Area-2045. It then presents the guiding principles and strategies adopted for various sectors and the applications of planning theories & techniques. Later on, in the chapter it elaborates the Land use policies & growth centre models adopted. The chapter concludes a detailed explanation of the concept plan for the planning area prepared based on the strategies to achieve the overall visions & goals.

12.2 EMERGING CONCERNS AND ISSUES

However, though its strategic location, Nagaon as a whole is lagging behind the rest of the country. Flood and water logging are the main reasons that the region has not been able to come up to a certain standard of all-round development, particularly in the countryside. Apart from that, there are many other issues affecting the growth of the region, such as, weak infrastructure, and exhausted and congested CBD area, narrow accessible carriage ways encroached by unorganised parking stretches in the city core area. Following are the main emerging concerns and issues in the project area:

- Flood and Water Logging- Flood and water logging have been a major concern for the region. During the last almost six decades, this problem has devastated the urban and rural economy of the region in a big way. Water level of the Kolong River, inadequate drainage system, informal settlements, and lack of solid waste management are the main reasons for flooding and water logging in the region.
- Flowing river like Kolong would have low pollution level; however, the river in the project area is polluted because of the raw sewage directly discharged into the river without any treatments. In addition, a vast portion of the municipal waste flows directly into the

river through its tributary rivers including Morikolong waterbody. Due to lack of efficient solid waste disposal mechanisms, people have a tendency to throw plastics and other garbage into the open drainage, which leads to clogged drains.

- Existing quality of roads and transport infrastructure in the region is extremely poor; on top of that, the encroachment on the roads has narrowed the streets, which is causing the traffic chaos. The collector roads and streets of markets and narrow and lack of sufficient parking area. All these are creating traffic congestions and parking problems in and around the city area.
- Neither artificial nor natural drains have the capacity to carry the storm water effectively. Additionally, untreated wastewater from residential, commercial, and industrial activities is discharged into the underground and open drains. Inadequate run-off of rainwater, as there is no storm water drain system.
- Haphazard Development- throughout the region, especially in market areas number of illegal constructions, encroachments on the pedestrian pathways and wetland, and violation of Byelaws have led to imbalanced built-open relationship

12.3 VISION, GOAL AND OBJECTIVES

The Nagaon GIS Based Master Plan - 2045 is initiated with the aim of achieving a better economic growth, better infrastructure facilities, and higher quality of life for the planning area while keeping the heritage, culture and form of the city intact and preserving the environment of the area. To achieve these, it is essential to set out goals and adopt the planning concepts and guiding principles so as to ensure maximum benefits and least adverse effects. The discontinues & non-homogenous geographical profile of the planning area which is a historical accident has thrown several challenges towards ensuring continuity and proper planned development. Despite this limitation, through forethoughts & reasonable approach to the situation desired results could be achieved. This section elaborates the vision statement, goals that are formulated to achieve the goals and the planning concepts, which will guide to achieve the same.

12.3.1 VISION

The Vision for the planning area perceived around the following core ideas:

1. Preserving the historical past, maintaining the liability of the present, and transforming our future through the implementation of the highest quality planning, to enhance the level of infrastructure service to all people of Nagaon Region.
2. Plan and implement the future by guiding the physical and economic development of Nagaon town while enhancing the quality of life for all through a comprehensive range of planning to promote the cultural, built and natural heritage in a sustainable manner.
3. Expand urban infrastructure to encourage appropriately compact, connected, and synchronized development by unlocking the potential of urbanization for better economic, social, and environmental outcomes at the heart of the government's economic strategy.

12.3.2 GOALS

Aspire to be Vibrant and Sustainable Urban entity for the Northeast India which is Socially Beneficial; Regionally Contextual; Environmentally Sustainable; Financially Viable; Institutionally Executable; and Politically Acceptable.

12.3.3 OBJECTIVES TO ACHIEVE THE VISION

1. To generate higher service facilities for attracting various developmental activities, investors, and industrial houses.
2. To generate facilities and activities to support small investors, informal sectors and slum inhabitants and rural migrants.
3. To improve the Transport Network system for faster communication and high standard linkages between the Growth Centers and their rural hinterlands.
4. To transform the whole region to a pollution free zone with conservation of biodiversity and environment.
5. To manage the natural and human resources for followed development.
6. To frame land policies and development proposals for eradicating bottlenecks for future development.
7. To provide decent housing for all sections of people living in the region.
8. To formulate a Disaster Management Policies to tackle natural hazards.
9. To provide high levels of physical and social infrastructure ensuring safe drinking water, improved sanitation, well distributed education, health, recreation and cultural facilities.
10. To convert the region to a learning and cultural centre for the state as well as nation.
11. To transform the region to a hub of tourism through preserving and promoting the rich cultural heritage and aesthetics of tea gardens, with high standard facilities and convenience.
12. To design an effective development control mechanism with a high value of public serviceability.
13. To reenergize the institutional and administrative system to manage future urban

12.4 PLANNING THEORIES

The planning is based on order of settlement, level of urbanization, planning area morphology it's evident that the growth over the last few decades are spearheaded due to certain factors like spatial organization of the several urban functions of commerce, production, education, and much more. One of the most important forces determining where

certain activities or growth is focused within a city deals with the price of land. Thus, it is important to understand different urban models developed over the course of time. The different planning theories are explained in the following section to understand which theoretical model suits best for the planning area.

12.4.1 CONCENTRIC ZONE MODEL

The Concentric Zone model is a model of the internal structure of cities in which social groups are spatially arranged in a series of rings. The concentric zone model was resulted from a study of Chicago in the 1920's by Ernest Burgess. This model is also known as Bull's eye Model. The idea behind this model is that the city grows outward from a central area in a series of rings. The size of the rings may vary, but the order always remains the same. Under this model, five concentric functional zones are recognized. At the center was the CBD (1). The zone of transition (2) was characterized by residential deterioration and encroachment by business and light manufacturing. The zone of independent workers' homes (3) was primarily occupied by the blue collar (wage-earners, manual laborers) labor force. The zone of better residences (4) consisted mainly of the middle-class. Finally, the commuters' zone (5) was the suburban ring, consisting mostly of white-collar workers who could afford to live further from the CBD. This model was dynamic. As the city grow, the inner zones encroached on the outer ones.

Disadvantages:

- This model was developed for American cities and had limited applicability elsewhere.
- The model does not take into account any physical barriers and gentrification - which may occur in the cities.
- It does not address local urban politics and forces of globalization.

12.4.2 SECTOR MODEL

In the late 1930s, Homer Hoyt's sector model was published, partly as an answer to the drawbacks of Burgess' concentric zone model. This model was based both on urban land-use pattern and on demography. Hoyt accepted the existence of business district at the core but suggested that various groups expand outward from the city centre along railroads, highways and other transportation arteries. As technology dealing with transportation and communication was improving, growth alone created more of a pie-shaped urban structure. Hoyt discovered that land rent (for residential, commercial, or industrial) could remain consistent all the way from the CBD to the city's outer edge.

Based on the above observation, Hoyt theorized the following:

- Cities tend to grow in wedge-shaped patterns—or sectors—emanating from the core business district and centered on major transportation routes.
- Higher levels of access meant higher land values; therefore, many commercial activities would be carried on in the central business districts, but manufacturing units would be developed in a wedge surrounding transportation routes.
- Residential areas would grow in a wedge-shaped pattern with a sector of low-income housing bordering manufacturing/ industrial sectors (traffic, noise and pollution would make these areas least desirable), while middle- and high-income households would be located as far away as possible from manufacturing industrial units.

Disadvantages:

- The theory is based on nineteenth century transport and does not make allowances for private cars that enable commuting from cheaper land outside city boundaries. This occurred in Calgary in the 1930's when many near-slums were established outside the city but close to the termini of the streetcar lines. These are now incorporated into the city boundary but are pockets of low-cost housing in medium cost areas.
- No reference is given to out-of-town development.